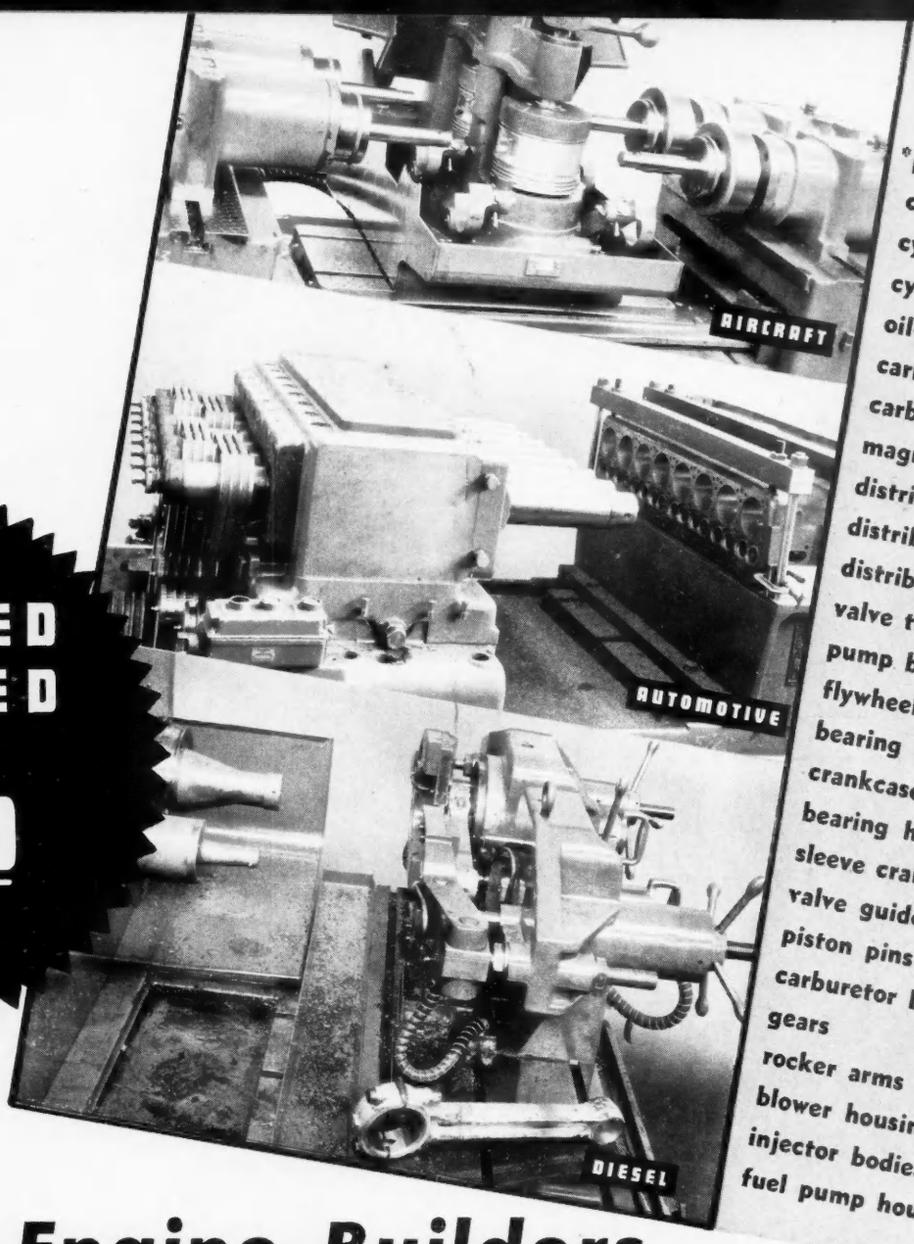
AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

SEPTEMBER 15, 1940



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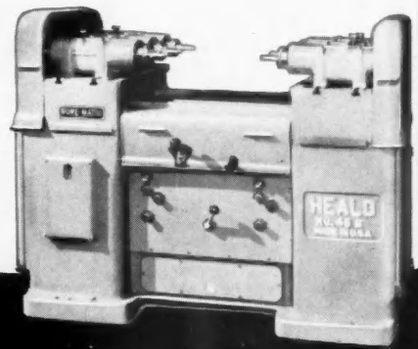

THE HEALD MACHINE CO. WORCESTER, MASS. U. S. A.

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The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Semi-Monthly

Volume 83 Number 6

CONTENTS

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Jos. S. HILDRETH, President and Manager
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Today, the great majority of rotors, coil tops, plug shields, distributor heads, sealed beam headlamp sockets and other electrical parts are molded of Durez. For Durez means toughness and light weight combined with high dielectric strength, insulation and resistance to moisture, oil and dirt.

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PLASTICS THAT FIT THE JOB

IN THIS ISSUE . . . .

AUTOMOTIVE INDUSTRIES

Reg. U. S. Pat. Off.

Volume 83 September 15, 1940 Number 6

Chrysler Corp. Discontinues Office of Chairman of Board

Out of respect for the memory of the late Walter P. Chrysler, the Chrysler Corp. has voted to discontinue the office of chairman of the board, thus making the president the chief executive of the corporation. K. T. Keller has been president for the last five years and has been directing the affairs of the corporation since Mr. Chrysler became ill in May, 1938. Herman L. Weckler, vice-president and general manager, has been elected to the vacancy on the board of directors.

The board adopted the following minute at a meeting Aug. 29 as a tribute to Mr. Chrysler:

"Walter P. Chrysler was a pioneer in life as he was in industry. His own development was typical in many ways of America.

"His early days, close to the American frontier, helped to fire his imagination; gave him the determination to realize his boyhood dreams of what could be done in such a land. From his birth and training he derived abundantly the inspiration, the energy and the capacity to accomplish.

"He had the initiative, courage, resourcefulness, and leadership to make dreams come true.

"Walter P. Chrysler was a builder.

"He built men as well as things.

"He built with both hands and brain, putting his sterling integrity into what he made.

"He got his start in overalls; made his first kit of tools himself; his whole life symbolized the dignity of work.

"His vigor was always tempered with the milk of human kindness; his energy was accompanied by an understandingly generous heart; his leadership not only inspired admiration but gave to all privileged to be associated with him an affection for this strong man capable in the strife of great accomplishments of such genuine, sincere friendship.

"The whole organization which bears his name breathes the inspiration made upon it by these qualities.

"They yield a lasting heritage.

"Because Walter Chrysler built well, the things he stood for so steadfastly in his organization will endure. To us his memory will be an inspiration and a blessing."

Fan scrolls for home-heating hot air fans are easily spun without wa
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You, Too, Can Gain by the Splendid Spinning Qualities of Inland Cold Rolled Sheets

MANY leading manufacturers, who spin steel, know that Inland Sheets, processed for the job, help cut production costs, and assure products that have the right appeal to loosen purse strings and push sales upward.

You, too, can take advantage of Inland Sheets specially made to fit your fabrication methods and products. If you are having trouble, or if you are planning production of a new product, call for an Inland Metallurgist. He will visit your plant, and study your problems. Based on long years of experience and study of your needs, he will prepare a sheet specification. Other Inland Metallurgists will follow the processing of the sheets that will be delivered to you.

This Inland way of meeting your requirements assures sheets of the correct temper and exact surface needed for your job. They will be uniform from shipment to shipment, and from year to year. You will find Inland Sheets help lower production costs and make better products.

Why not ask your nearest Inland office to send a metallurgist to study your sheet problems? He can help you as he has helped others—and, there is no obligation.

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AUTOMOTIVE INDUSTRIES

Published on the 1st and 15th of the month

Vol. 83, No. 6
September 15, 1940

Skilled Labor Requirements...

Nature and quantity of jobs linking men and machines surveyed by American Society of Tool Engineers. Previous estimates found to be low.

FINAL tabulations of technical and skilled labor requirements by U. S. industry, by the American Society of Tool Engineers, reveal that earlier estimates were on the low side, according to Ford R. Lamb, executive secretary. To take care of immediate needs, and for definitely planned expansions during the remainder of the year—excluding, however, "potential" expansions due to possible defense production requirements—metal-working plants in the U. S. need the following:

110,800 Tool Engineers
408,800 Tool and Die Makers
741,000 Skilled Mechanics

The totals break down as follows: For immediate production requirements, there are needed:

32,570 Tool Engineers
127,750 Tool and Die Makers
408,816 Skilled Mechanics

To take care of definitely planned expansions, the following additional men are required:

78,208 Tool Engineers
281,060 Tool and Die Makers
332,160 Skilled Mechanics

The tabulation reveals that 53 per cent of all metal working plants have definite plans to increase productive capacity during the last half of 1940.

Analysis of the returns reveals that the shortage of skilled help is general throughout all major geographical industrial areas, though local conditions show considerable variation in the type of shortage involved. Comparisons in percentages of metal-working plants in the three major industrial regions are shown in the table at the right.

Typical of varying local conditions were tabulations for Michigan and Ohio. In the latter less than 7 per cent of plants need additional tool engineers compared with over 25 per cent in Michigan. In contrast, 66 per cent of the Ohio plants need additional tool and die makers, compared to less than 38 per cent in Michigan. Ohio also is apparently worse off in its need for skilled mechanics, with 86 per cent of plants looking for additional men in this classification compared with 50 per cent in Michigan.

Principal Causes of Shortage Cited

The survey also aimed to establish the underlying causes of the present shortage, as a basis of laying the groundwork for corrective measures. Summarizing answers to this part of the questionnaire showed three outstanding "reasons":

1. "Educational system has not kept pace with the machine age."
2. "Union labor's restrictive attitude toward use of apprentices by industry."

Skilled Labor Requirements

Per cent of plants needing:	New England	Middle Atlantic	East North Central
Tool Engineers	25	31	25
Tool and Die Men	57	62	51
Skilled Mechanics	43	69	64
Percent of plants planning expansions in 1940	65	55	54

GENERAL

Another Slant on Production for Defense

THE AUTOMOBILE MANUFACTURERS ASSOCIATION calls attention, in a new booklet, to the fact that the same fundamental requirements apply to mass production of defense items and of cars and trucks. Entitled "What It Takes," the booklet stresses "time, planning and specialization" as the key factors contributing to America's production capacity, and illustrates this theme in a step-by-step description of the work involved in production in the nation's automobile plants.

Starting with experimental engineering work on engines and other mechanical parts, "What It Takes" leads through development of body designs, selection of new machinery, creation of dies for stamping metal parts, line-up of sources for parts and raw materials, and finally the annual rearrangement of plant facilities at "change-over" time.

3. "Slowing down and interruption of industrial training programs through depression years."

In connection with the last mentioned "cause" the survey revealed that 30 per cent of plants now have some type of apprentice training program, while 41 per cent train some men in their own way for their particular requirements. Virtually all large industrial organizations now have some form of training program. Smaller plants, however, apparently have not been able to do this.

In some industrial localities, the report reveals, industry and vocational schools are now working closely together in the co-operative training of skilled men and tool engineers.

Educational Plan Developed by Committee

Anticipating the need for revision in training of men for skilled and technical positions in industrial production, the A.S.T.E. some time ago set up an educational committee to develop a plan of educational and training work. The committee, headed by Herbert D. Hall, past chairman of the New York-New Jersey Chapter of the society, among its activities, has virtually completed a preliminary agenda for a proposed high school course as preparation for proposed apprentice training programs. This is being submitted to school supervisors and directors of industrial training programs all over the country, through sub-committees in local chapters of the A.S.T.E.

Following receipt of reports and criticisms from these chapters, the final proposed course will be drafted for presentation at the society's semi-annual convention in Cincinnati, in October.

Serving on the A.S.T.E. Educational Committee in addition to Mr. Hall, are the following: J. R. Weaver, director of equipment, inspection and test, Westinghouse Electric and Mfg. Co.; Dr. O. B. Jones, Detroit College of Applied Science; J. P. Wiley, National Tube Company, McKeesport, Pa.; and Otto W. Winter, Columbus McKinnon Chain Corp., Tonawanda, New York.

An advisory committee to the main committee is composed of Charles L. Thomson, Singer Mfg. Co.; C. Frank Sheeley and Frank R. Wodtke, Hyatt Bearings Division, General Motors; E. N. Wallace of the New York City School System; C. B. Carlson, Thomas A. Edison, Inc.; and Frank J. Oliver, associate editor, *The Iron Age*.

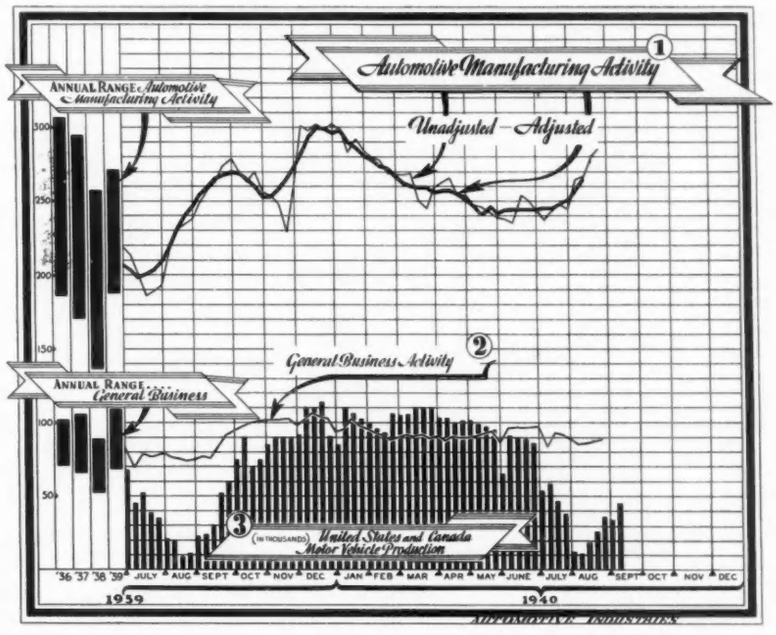
Assistance in the society's work has also been secured through the Federal Committee on Apprenticeship Training, and the Personnel Research Federation.

The Brass Hat-Rack

"Can't we carry the new model changeover idea into our stenographic department?"

BUSINESS IN BRIEF

Our own view of automotive production and sales; authoritative interpretation of general conditions



Weekly indexes of automotive general business charted

Seasonal Increase Gains Momentum

PRODUCTION in the automotive industry was gradually accelerated during the first half of September as more manufacturers overcame assembly difficulties on the 1941 models and sent them off the line in increasing quantities. Nash and Willys were the only plants not yet in production on 1941 motor cars in early September.

Output for the first half of September was estimated at 80,000 motor cars and trucks, but the last half of the month was expected to show a substantial seasonal increase and the month's total is likely to exceed the 192,672 units produced in September, 1939.

For the week ending Sept. 7 production was estimated[1] at 33,000 vehicles as Labor Day cut the working week to four days. GM turned out 12,500 units, Chrysler accounted for 6000, and Ford, just getting under way on 1941 models, produced 3300 vehicles. Studebaker paced the independents, followed by Hudson, Packard and Graham. Body assembly difficulties at several plants curtailed output somewhat.

Production was expected to climb to 47,000 units for the week ending Sept. 14. Factory sales during August totaled 86,000 units, according to the estimate made by the Automobile Manufacturers Association.

New passenger car registrations totaled 2,130,600 units for the first seven months of 1940, according to R. L. Polk & Co., a gain of 25.6 per cent over 1939. New truck registrations in the same period were 342,031 units, an increase of 16.5 per cent. July new passenger car registrations were 315,246 units, a gain of 37.5 per cent over 1939. July truck registrations were up 14 per cent over the previous year to 50,913 vehicles.

August sales continued to show the same big gains despite the usually slack summer season. Chevrolet sold 63,116 new cars and trucks in August, a gain of 29 per cent, while used car sales of 162,428 units were up 33 per cent over the 1939 month. Buick retail sales were up 56 per cent in the same period and Pontiac deliveries rose 41 per cent.

Reports from the Department of Commerce reveal that exports of new passenger cars, trucks, engines, parts and accessories fell 6 per cent for the first six months of 1940, compared to the like period of 1939, dropping from $144,364,867 to $135,228,484. The European war has greatly curtailed exports to that market as well as to Union of South Africa and Australia, while shipments to South America have shown a sizable increase.

AUTOMOTIVE MANUFACTURING ACTIVITY spurted ahead in the weeks ended Aug. 24 and Aug. 31, the unadjusted index barometer regaining levels untouched since last February by passing through the points 280 and 285. The adjusted index curve continues its ascent with the levels of 258 and 265 reached in the weeks ended Aug. 10 and Aug. 17.

[1] 1923 average = 100; [2] Prepared by Administrative and Research Corp. New York. 1926 = 100; [3] Estimated at the Detroit office of AUTOMOTIVE INDUSTRIES.

Buick....

BUICK'S chief engineering development for 1941 is a compound dual carburetor, which is standard equipment on all except some of the Series 40 models, where it is available at extra cost. Only one unit of the carburetor functions during part-throttle operation, the second coming in as the accelerator pedal is pressed down all the way. Increased power and reduced fuel consumption are the results of this new carburetor installation, the output having been increased to 125 hp. on the 50 and to 165 hp. on the 60, 70 and 90.

The Buick lines generally remain the same as last year, comprising the Series 40 and 50 with 121-in. wheelbase, the Series 60 and 70 with 126-in. wheelbase, and the Series 90 with 139-in. wheelbase.

The 50 and 70 continue the torpedo-style bodies introduced last year, but the 40 and 60 have an entirely new body styling in which the profile shows a bold faired line extending from the front clear back to the tail. These bodies have three side windows and feature concealed running boards that are exposed only when the doors are opened. The Series 90, too, has a new style of body, which follows the lines of the 50 and 70 bodies, but has concealed running boards and three side windows.

Extensive changes have been made in the front-end styling. Headlamps have been moved out, and the license-plate holder now is part of the front bumper. The die-cast radiator grille now is larger and consists of three sections—two side grilles and a heavy, decorative center section. All of the Buick 1941 lines have the same front-end treatment, and the parts are interchangeable.

Most important among the mechanical changes in the chassis are the adoption of the Saginaw recirculating-ball-type steering gear on all series, a redesign of the column-mounted shift lever mechanism to make the mounting concentric with the steering column, a lessening of the height of the coil springs and a consequent reduction in the frame height by $\frac{5}{8}$ in. on sedans and 1 in. on convertibles. In addition, the degree of interchangeability between the parts of the knee-action mechanism has been increased, the lower control arms now being identical on all models. A single-piece removable hood is now used, which is latched on both sides. It can be swung up from either side, pivoting around the unopened side, and it can be removed entirely when an overhaul is required.

As will be seen from the diagrammatic drawing herewith, both carburetors of the new carburetor installation are connected to a common four-port intake manifold, so that the inside barrels of both feed cylinders Nos. 3, 4, 5 and 6, and the outside barrels, cylinders Nos. 1, 2, 7 and 8. Both Stromberg and Carter carburetors are used this year, the latter with a new concentric bowl. The forward unit is a complete carburetor in every respect, including an automatic choke, while the rear one is almost rudimentary, but includes idling and main jets and an auxiliary throttle which is kept closed by an offset counterweight and opened by the velocity head of the air flowing through it. It is claimed that the new manifold system has permitted an increase of one-half a ratio in the compression ratio, and a slight further increase has been made possible by a change in the form of the piston head. All of the models with the compound carburetor installation have a compression ratio of 7, while that of the 40 engine is 6.5. Important changes have been made in the design of the piston, which in addition to the new dome, has a full-cylindrical, slotted skirt.

Engines remain the same basically, the 40 engine being a valve-in-head, eight-in-line design with 3-3/32-in. bore and $4\frac{1}{8}$-in. stroke (248-cu. in. displacement), rated 115 hp. at 3500 r.p.m. with a compression ratio of 6.5 and with standard carburetor. The Series 40 with compound carburetors and the Series 50 have the same mechanical specifications, but are rated 125 hp. at 3800 r.p.m., with a compression ratio of 7.

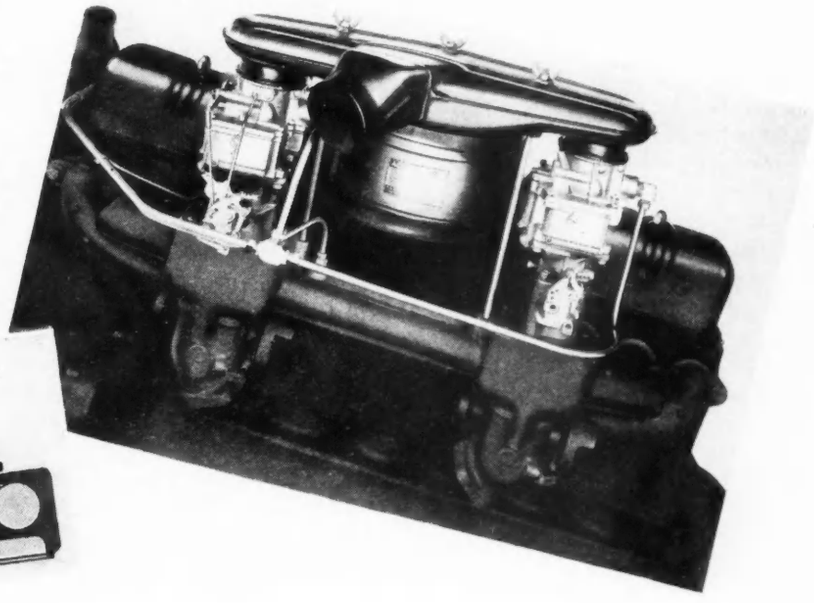
Series 60, 70 and 90 are fitted with valve-in-head, straight-eight engines of 3 7/16-in. bore by 4 5/16-in.

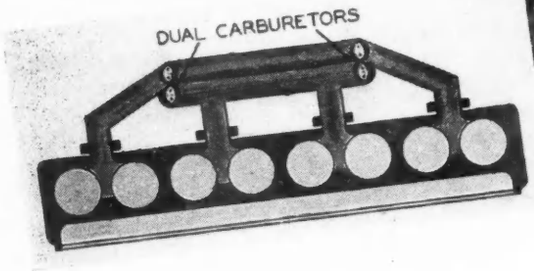
aims at fuel economy with compound dual carburetor

(Opposite page), Aerodynamic streamlined styling is found in the 1941 Buick special Model 46-S, a six passenger sedan-coupe.

(Bottom of page) A brand new Limited Series in addition to the regular models is available in a complete line of custom cars.

The illustration at the right shows Buick's new fuel-supply system with two dual carburetors feeding the new "Fireball" engine. Horsepower on the Super series has been increased from 107 to 125, and on the Century, Roadmaster and Limited series from 141 to 165. A diagrammatic sketch of compound carburetor operation is shown below.

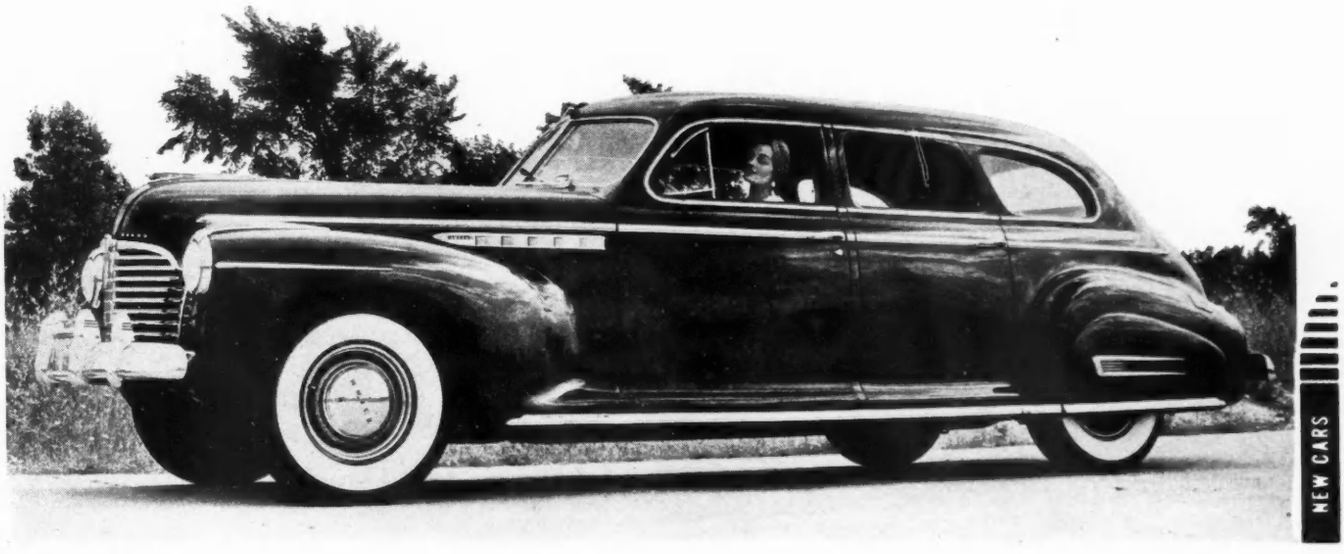




stroke (320-cu. in. displacement), rated 165 hp. at 3800 r.p.m., with a compression ratio of 7.

The two carburetors have a common air-intake manifold and a single oil-bath-type air cleaner. A flexible tube similar to that used for the defroster system leads from the intake of the air cleaner to a point behind the radiator, where fresh, cool air is taken in. This flexible pipe, moreover, is said to have a damping effect on the air column, and the former intake silencer has been eliminated.

Spark plugs of 10 mm. thread diameter are now used, which are claimed to operate satisfactorily over a wider range of engine temperature, as required in high-output engines. Main bearings are of a new precision type developed jointly by Buick and Moraine Products Division, as described in these columns recently. They have linings of high lead babbitt, with a porous matrix sintered to the steel back. Production methods for connecting rods have been improved



recently to give rods of more nearly uniform weight. The AC Klear-Kleen oil filter is continued as standard equipment, but its installation has been improved and a higher pressure is now impressed on the filter element.

Engines now have a single support at the rear end, which further reduces the transmission of engine vibration to the chassis and body, and all engines are now fitted with heavier torsional vibration dampers. The fan-drive ratio has been reduced to lower the noise level, and is now slightly less than 1:1.

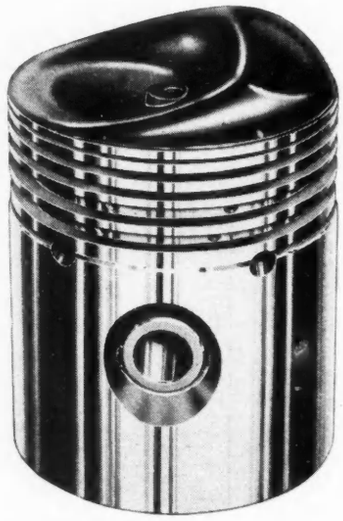
All engines with the compound carburetor installation have McCord thin-steel (0.015 in.) cylinder-head gaskets which are coated with a special lacquer on both sides that forms a gas-tight seal after it has been heated during the run-in period. On the 40 engine a conventional gasket of 0.070-in. thickness is used, and replacement of this by the thin gasket when the 40 is to be provided with a compound carburetor changes the compression ratio from 6.5 to 7.0. Thus all cylinder heads for the same engine are interchangeable, in spite of the different compression ratios used.

A new cover for the spark plugs is provided with ventilating louvers at the front and rear of the engine. Pushrod covers have been redesigned to prevent leaks at its joints. The flange around the edges is turned in to make direct contact with the gasket, and the ribs at the stud holes are now vertical instead of criss-cross, to permit drawing up the nuts tight without buckling the cover.

Owing to the reduction in the speed of the fan (which is combined with the water pump), all of the 1941 Buicks are equipped with a larger pump, one design being used throughout the line. The same muffler is used on Series 40, 50, 60 and 70, while on Series 90 a muffler of smaller diameter but greater length is used, due to space conditions imposed by the design of the frame. This longer muffler has a slip joint at the middle of the inner tube, to allow for expansion. All Series have two-piece exhaust pipes, which facilitate disassembly and removal of the exhaust system. There is a Y-shaped connection from the exhaust system to the dual carburetor.

Batteries of 120 instead of 115 amp-hrs. capacity are now carried, under the right side of the hood as before, but with a new mounting base and hold-down strap. A shield protects the battery against engine heat.

Clutches on Series 60, 70 and 90 have heavier coil springs, called for by the increased engine power. Clutch plates on all models separate more than in the past when the pedal is depressed which increases clutch life and improves declutching. This has been achieved by increasing the shank length of the pedal to obtain a longer throw. All series now have the same type of clutch - release mechanism, which is new for the Series 90.



New 1941 Buick pistons showing dome shaped head.

Referring to the diagram of the carburetor installation, with the engine idling, both throttles are closed and mixture is being supplied by the idling systems of both units. Valve-opening and mixture adjustments are alike on both units. Under normal running conditions the throttle of the forward carburetor is partly open and its main metering system is in operation. The throttle of the rear carburetor is closed and only its idling system functions. When the accelerator is fully depressed while the engine is running at low speed, both throttle valves are open and the forward carburetor functions normally but the rear one does not, owing to the fact that its auxiliary valve is closed. At 15-20 m.p.h., with the accelerator all the way down, the auxiliary valve begins to open, and the rear carburetor begins to function. At 35-40 m.p.h., with the accelerator way down, the auxiliary valve of the rear unit is wide open and both units supply a balanced mixture.

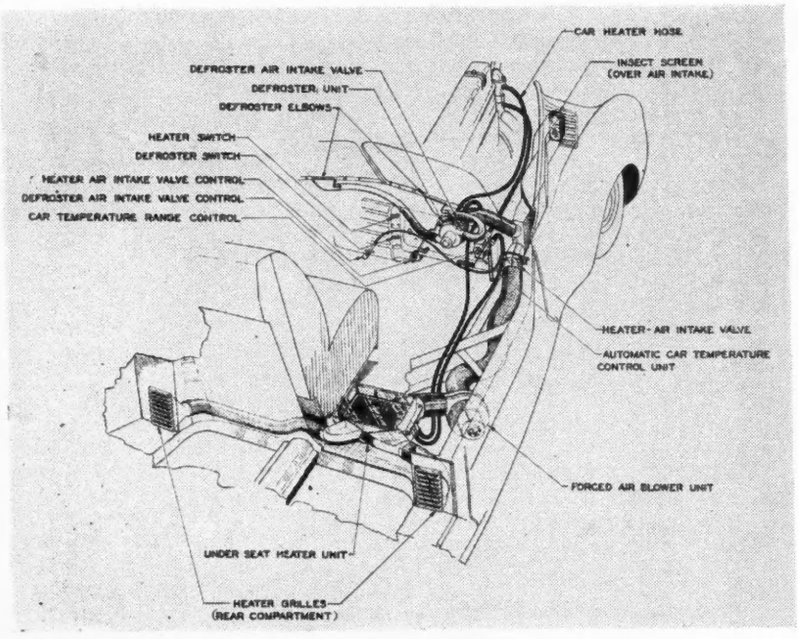
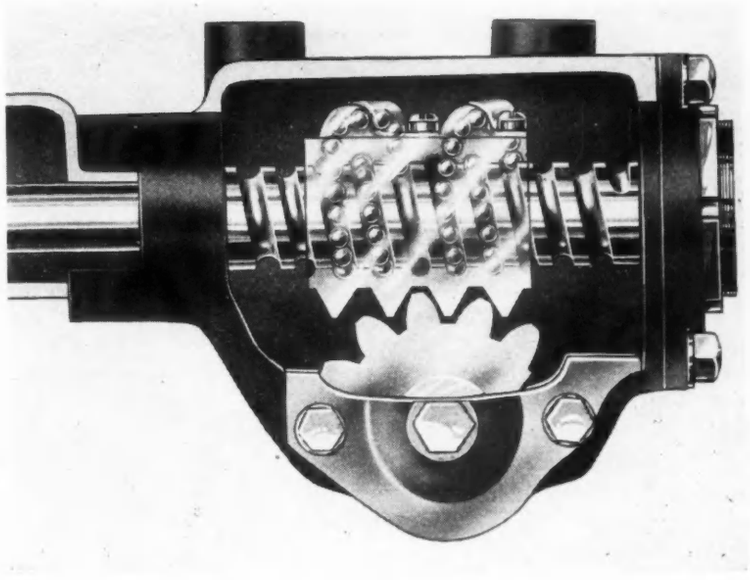
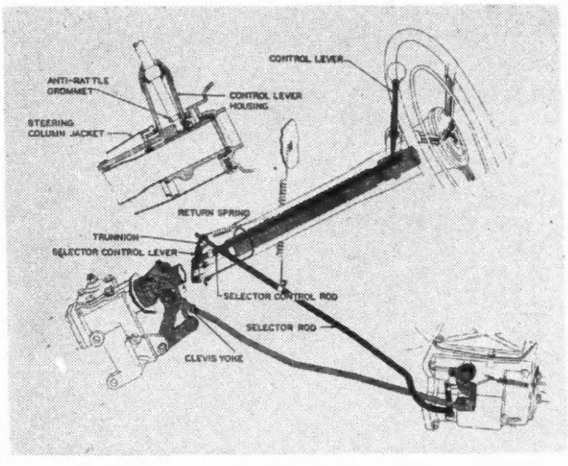


Diagram showing Buick under-seat heater system and car temperature control, fresh air in-take and defroster system on 1941 Buick cars.



Cutaway view of new Buick steering gear mechanism.

The rear tread has been increased on all except the 90 series. Front and rear-seat widths have been increased on the 40 and 60 models. On all sedan models the spare tire is now mounted in a vertical position. An important detail improvement in the bodies is that the instrument-panel mounting has been strengthened by using a continuous stamping with a pair of gussets at the center section to provide a rigid support for the radio receiver. The instrument panel is new and has a die-cast center panel for the radio. All of the numerous accessory-control buttons (for the heater, the defroster, etc.), are arranged neatly along the vertical edges of the die-cast panel, where they are unobtrusive yet readily accessible. To conform to various state regulations, the rear-signal flasher is now installed in a separate section at the side-mounted tail lamps, the former location on the trunk lid having been abandoned. The characteristic trunk-lid ornament remains, but without illumination.



Diagrammatic sketch showing Buick remote control gear shifting mechanism.

While the brake set-up remains unchanged, all models except the 90 will have centrifugally-cast drums and steel back plates. Brake master cylinders and wheel cylinders have been standardized, and are now identical on all series. Master cylinders now have a cup with a brass insert which prevents the cup from being damaged by holes in the piston.

Front hubs, spindles and inner and outer wheel bearings are larger than last year, on all series except the 90, and much longer bearing life is expected. All models have new compression-type rubber bumpers and retainers, designed for a greater range of compression. The bumpers are now secured to the retainers with studs and nuts.

On the Series 90, direct cross-steering tie rods eliminate the intermediate steering arm bracket assembly, the arrangement being similar to that on Series 70. All series have a new tubular transverse radius rod, with new brackets at the frame and axle housing. At the axle end this rod is closer to the axle housing than previously, this change having been made to provide room to carry the spare tire upright in the right side of the trunk. With the longer torque tube, the up-and-down motion of the body is more nearly in a straight line, which makes for increased comfort on rough roads.

Propeller shafts remain the same, except that in the Series 90, where the engine has been moved forward, the stub shaft at the front end is longer.

Improvements in the transmission include strengthening of the lock ring for the clutch-gear-bearing retainer, the provision of a bearing-retainer washer of hardened steel in the Series 40 and 50 between the bearing and bearing spacer at each end of the counter gear, and the use of a stronger tooth form for the low-speed and reverse gears in the Series 60, 70 and 90. Rear-axle ratios have been revised as follows: Series 40, 4.4; Series 50, 4.1 (this ratio is used also on the Series 40 when the latter is equipped with the compound carburetor); Series 60 and 70, 3.9; Series 90, 4.2. So-called "economy ratios" are available for the 40 and 50 (3.9) and the 60 and 70 (3.6). On Series 40, 50, 60 and 70 the axle housing is strengthened by an increase of 3/16 in. in the diameter, and both housing and axle shafts are longer because of the widening of the tracks. Strut rods are now riveted to the brackets at the front of the torque tube. A secondary bumper or rear-axle stop has been added immediately back of the rubber bumper on the rear axle. This will ease jars in the event the springs "bottom" on rough roads. The rear stabilizer is continued on all series except the 90. Tires remain the same throughout the line.

Plymouth

COMPARATIVELY few mechanical changes have been made in the Plymouth for the coming year. This popular-priced car is again being offered in two series —the 1941 Plymouth and the Plymouth Special Deluxe.

Improvements have been made tending toward greater handling ease, road performance, and safety, and body appointments are decidedly more luxurious than in the past.

The rating of the engine has been raised from 84 to 87 hp. This increase in output was achieved by increasing the valve lift and by redesigning the intake manifold with the object of ensuring better mixture distribution. The engine is now fitted with new "high-duty" bearings which are claimed to dissipate heat more rapidly and to have longer life. Crankshaft fillets at all main and crankpin bearings have been increased to reduce the chances of fatigue failure. The top compression ring is narrower, and the bottom oil ring is of the taper-section type, which is claimed to reduce oil consumption. The engine is now fitted with an oil-bath-type air cleaner, which is more effective than that formerly carried. It has a floating intake for the oil pump.

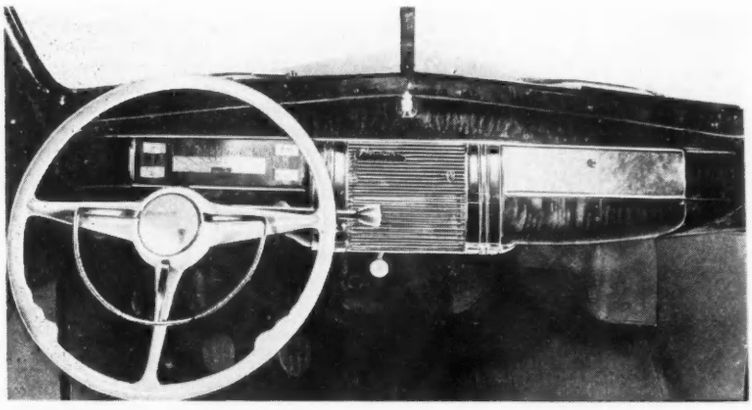
In the transmission the ratio of the intermediate gear has been increased to 1.83, and this, in combination with increased engine power and a larger rear-axle ratio makes it possible to start the car under all normal conditions in second gear, the first gear being held in reserve for starting on up grades and for pulling out of deep ruts. In connection with this practice of starting in intermediate gear it is worth mentioning that the engine torque has been increased over the whole speed range. On coupes the rear-axle ratio has been changed from 3.9 to 4.1 and on sedans from 4.1 to 4.3. These various changes have the effect of increasing the acceleration in second gear by 26 per cent. The transmission is of new design and has a trunnion-type gear selector which is said to facilitate shifting and to prevent "locking in gear." The battery has been placed under the hood, which it is easy to get at. A special device on the battery indicates when the proper amount of water has been put in, the fluid apparently changing color when the proper level is reached.

What is referred to as the Powermatic gearshift is optional at extra cost. Where this unit is fitted, gears can be shifted with a light finger flick, 80 per cent of the effort required being supplied by a vacuum device. The standard manual type of shift lever on the steering post also is easier to operate this year.

Front end and broad-shouldered fenders on the 1941 Plymouth model. Note how the fender catwalk curves up to form the sides of this year's larger hood. Sealed-Beam headlamps are set into the fenders higher than before.

Rear springs have grooved leaves of Amola steel and are said to give softer spring action and to have longer life than in the past. Metal spring covers are now standard on all models. Individual front suspension on coil springs also is standard on all models. Rear springs are mounted in rubber at both ends. The airplane-type shock absorbers on the front springs are softer this year.

What is claimed to be the greatest advance in safety features this year is the adoption of "safety-rim" wheels, which reduce the hazards of tire blow-outs and



Close-up of Plymouth's new instrument panel design, with walnut grain in contrasting shades setting the key for a new, two-tone interior scheme.

punctures, as they prevent the "throwing" of a flat tire by the wheel, even at high speed. Rims are of such cross section that the beads of a deflated tire cannot work loose, and it is claimed that at speeds up to 40 m.p.h. a deflated tire on this rim gives the same driving effect as an air pressure of about 10 lb. per sq. in. in a tire on an ordinary rim.

The Plymouth line includes a coupe, a two-door sedan, four-door sedan, utility sedan, and panel delivery models. Special Deluxe body styles include a coupe, four-passenger coupe, two-door and four-door sedans, seven-passenger sedan and limousine, and a station wagon. This makes 13 body styles altogether. This year a wider choice of standard body colors is offered, including Mandarin maroon, Metallique green, Jib green, West Point gold, Flight gray, Plaza brown, gunmetal, Airwing gray, Eddins blue, Aviator blue, and black. Besides these, four different two-tone color combinations are available on Special Deluxe sedans at extra cost.

Bodies have improved sealing against dust, water, heat, and noise. They are tested at the factory by means of an artificial storm machine, and a new "vacuum test" is applied to the bodies as part of the regular production procedure. The one-piece hood with inside lock is longer and wider at the front; it is controlled from the driver's seat and has an extra safety catch outside for the service attendant to release. There are softer seat cushions in all models, and new two-tone upholstery is standard in closed models of the Special Deluxe.

Body moldings start at the base of the new front

engine stepped up for 1941 buyers

"Fashion-Tone" is Plymouth's name for new interior styling. This is the 1941 Plymouth Special Deluxe 2-Door Sedan.

New Fashion-Tone interiors of Plymouth models for '41 combine new fabrics, walnut-grained moldings and tenite plastic. Two-tone upholstery with cushions in beige and a deep shade of blue for contrast in the upper section of door panels marks the 1941 line. Tenite plaques on the window moldings match the plastics in door handles and steering wheel. The new cushion design comes all the way to the floor.

grille, sweep upward in a curving "Vee," and flow back horizontally along the hood and body, all the way to the rear deck. There they sweep down toward the road. The Vee in front is the foundation for two ventilating sections, one on each side, outlined in curves of chrome across the catwalk, with 11 chrome-plated bars in each louver section. Above the grille, where the Vee sweeps around the hood, its diverging curves are joined by three chevrons in chrome.

The front end of the new Plymouth is considerably more "massive." Fenders are higher and broader; a new, larger, one-piece hood sweeps farther out in front, and the catwalks curve up to meet the hood at a higher point. Sealed-beam headlights are streamlined into the fender contour, slightly higher above the road, and are surmounted by larger parking lights that rise above the fender surface and then sweep back to merge with the upper curve of the fenders. A new and larger Plymouth ship emblem is mounted on the nose, and Special Deluxe models carry a broader, heavier bumper with wide flanges at the ends. Belt moldings are wider. Chrome moldings around window reveals are available at extra cost. On two-tone sedans, still another chromium bead sets off the upper contrasting color from the lower half all around the car.

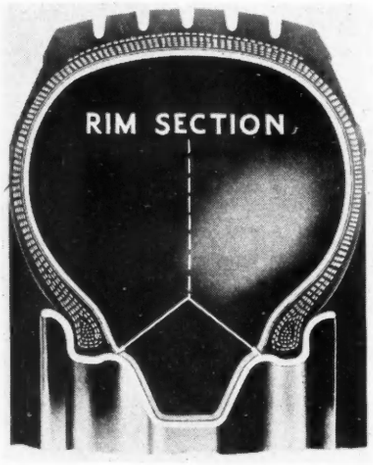
Front doors open wider, and in Deluxe models check straps hold the door open to prevent accidental closing on a passenger's foot. A new medallion decorates the rear-deck lid. The stop light is in a separate housing at the center and also illuminates the rear license plate. Twin tail lamps of new design can be equipped with direction signals—with other signals for the front—if the customer desires. In sedan models, the spare tire and wheel are carried inside the trunk.

Horns are now mounted ahead of the radiator core back of the grille, where their effectiveness is not impaired by the fan blast. Front seats are mounted on ball bearing slides, which makes for easier adjustment, the forward motion being further assisted by helper springs. As the seat moves forward it rises, which maintains the driver's vision.

All closed models of the Special Deluxe line have two-tone interiors in blue and beige, with walnut-grained moldings and luminous plastic. Broadcloth or pile fabric is optional as upholstering material. For color contrast, a deep shade of blue appears on the upper section of door panels, and in two-door sedans, on the lower rear side quarter above the seat. The same color scheme is carried out with blue weathercords around the doors, on assist straps and visor bindings, and in the robe cord. A chromium bead marks the dividing line between the contrasting color panels.

Window moldings have a walnut grain, and on the aprons appear new tenite plaques with color highlights of vermilion. All interior hardware has been redesigned. Door handles and window regulators also have tenite inserts.

There is a deep-pile carpet in the rear compartment,



Cross-section view of Plymouth's new "Safety Rim" wheel which is now standard on all models throughout the line. This reduces the hazard of blowout or puncture at high speeds, by holding the bead of a flat tire firmly on the wheel.

and a felt-and-rubber mat in front. The new steering wheel is a light beige gray matching the other plastics inside the car. The top half of the wheel is wide open to afford the driver a clear view of all instruments, and the wheel has a horn-ring in the lower half.

The instrument panel has been completely restyled and is finished in two harmonizing shades of walnut grain. The "straight-line" safety-signal speedometer has a translucent needle that changes color for different driving speeds. This is flanked on the left by the oil gage and ammeter and on the right by a heat indicator and fuel gage.

(Turn to page 259, please)

A Hydraulic Transmission Differential

By C. A. NORMAN*

AN ORDINARY gear transmission has the defect that it does not automatically adjust the torque-speed relation at the axle to the available power and the resistance encountered. An ordinary gear differential has the defect that it does not concentrate the torque on the wheel that maintains traction, but wastes available power on a slipping wheel.

The writer suggests a possibility of overcoming these defects in a hydraulic design which combines transmission and differential into one unit.

In Figs. 2 and 3 *A* denotes the impeller (in half section) of a centrifugal pump. It discharges liquid through channels *B* and guide vanes *C* onto two turbine runners *D* attached to right and left shafts *F* which, in turn, may transmit the motion through gearing *H, I, J* to the half axles *G*. By shifting sleeve *I*, the gears may be set for reversal or for idling.

The liquid returns through passages *E* to the inlet of the impeller. It is understood that the right half of the impeller circulates liquid to and from the whole circumference of the right turbine; similarly, the left half to and from the left turbine. The flow lines *a*—*a* and *b*—*b* in Fig. 3 give an idea of the flow to the turbine, lines *c*—*c* and *d*—*d* of the return.

Fig. 1 indicates how the turbine might be laid out for multi-stage action. But for light cars such action probably would not be necessary or desirable to secure adequate efficiency.

The large sliding roller bearing on gear sleeve *I* is not meant to be used in a practical design. It is used here for simplicity to show the principle of action.

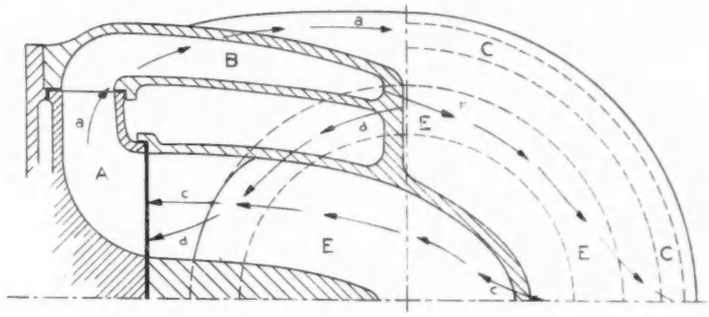


Fig. 3

* Robinson Laboratory, Ohio State University, Columbus, Ohio.

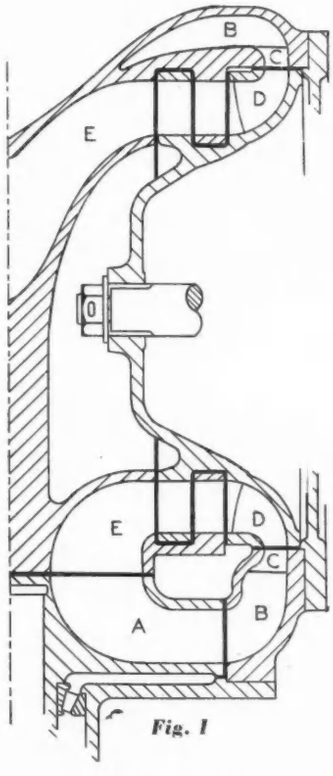


Fig. 1

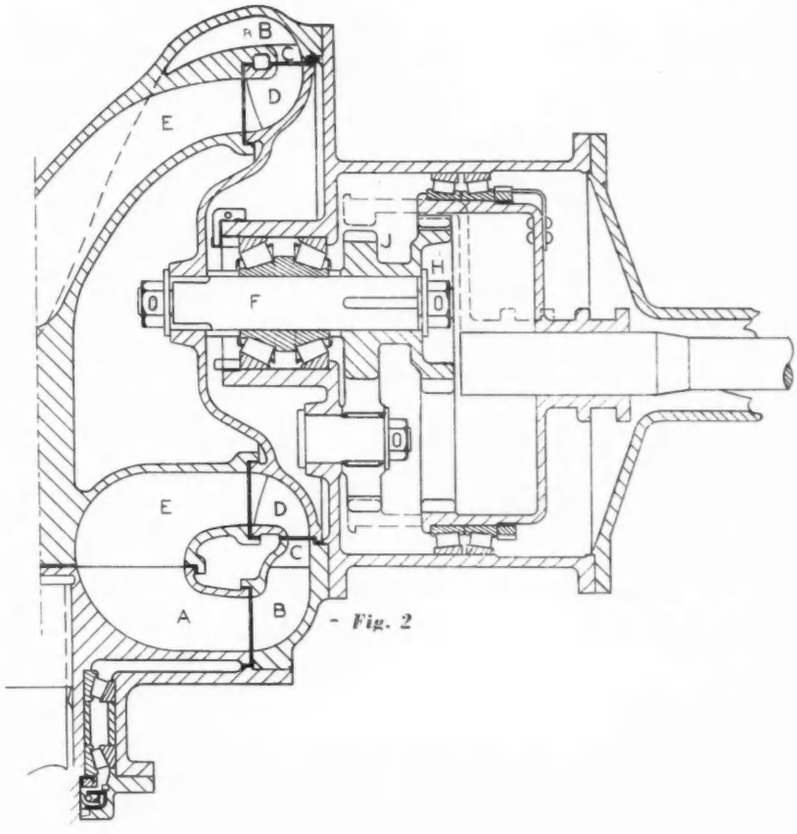
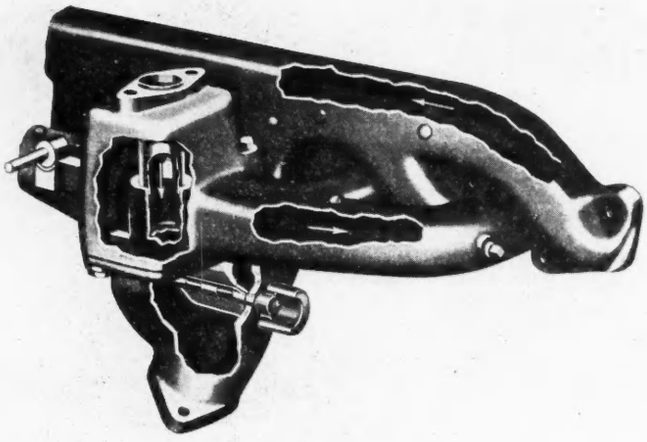


Fig. 2



Cross sectional view of exhaust manifold, intake manifold, steel riser tube and pre-heater jacket of 1941 Pontiac engine

Pontiac...

THREE lines of cars, two of them with entirely new bodies, mounted on two basic chasses, constitute the Pontiac offering for the 1941 season. Added attraction, however, is the fact that both the Six and Eight engines are now interchangeable in each chassis, providing, in reality, six different lines of automobiles.

Styling treatment is fresh, marks a complete family resemblance for all of the models in the line. Interior treatment is new with new instrument panel and instruments, handsome combinations of upholstery with leather trim and piping. On the exterior, two-tone paint, chrome moldings, and "Speed" lines in the fender skirts blend to create an impression of low dynamic styling. Radiator grilles are made in a one-piece assembly to provide greater efficiency for cooling. The hood is a huge stamping extending well down the sides and completely over the front end down to the grille, effecting maximum accessibility for under-hood work.

Model designations descriptive of the styling are as follows: DeLuxe Torpedo, on 119 in. wheelbase, 2 in. longer than last year, has a new body—wider, roomier and lower than last year.

Streamliner Torpedo, with an entirely new streamlined body styling, is mounted on a 122-in. wheelbase chassis, up 2 in. over last year. This group also includes a deluxe model, called the Super Streamliner Torpedo.

Custom Torpedo, continuing the basic body shell of last year's Torpedo, is on the same 122-in. wheelbase chassis as the Streamliner.

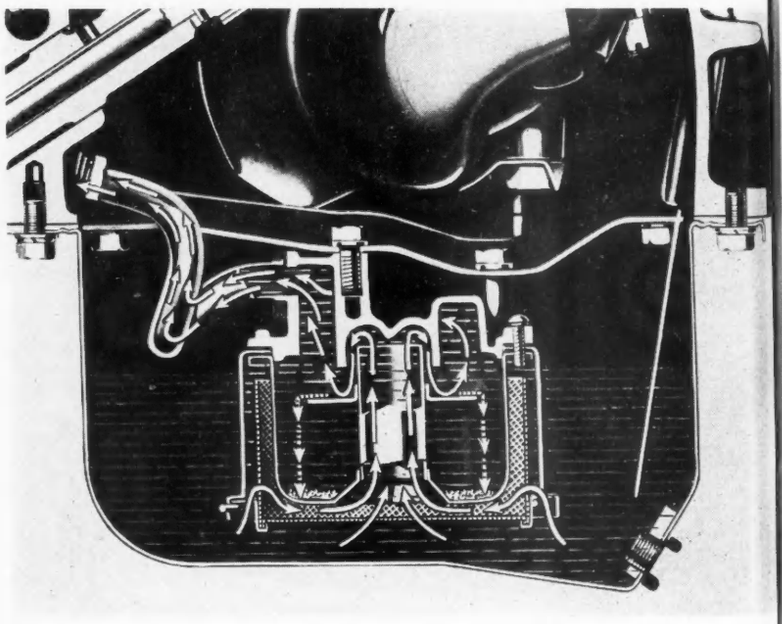
This year all three lines are without outside running boards, the two new body styles having concealed interior steps, exposed when the doors are opened. Frames are new and wider, the rear tread being upped to 61½ in. from 59 in.

In addition to the passenger car models noted above, Pontiac offers a Station Wagon on the 122-in. chassis, supplied with either the Six or the Eight engine. This model seats eight passengers including the driver. The taxicab is supplied only on the 119-in. chassis with the following exceptions to the standard specifications:

Ten in. single spring clutch—special distributor cap—special oil bath air cleaner.

Special front and rear springs—heavier wheel rims—special taxi seat cushion springs.

Generally speaking, while the basic mechanical features are continued unchanged they incorporate many detail changes and refinements in the interest of improved performance, increased efficiency. Perhaps the most noteworthy feature is the continued improvement in riding comfort due to increased wheelbase length,



Cross section of Pontiac's new oil filter

Over center clutch pedal booster spring

Air conditioning arrangement in 1941 Pontiac showing underseat heater, windshield defroster, fresh air intake and control box

Radiator grille of the 1941 Custom Torpedo four-door sedan on 122 inch wheelbase with choice of either six or eight cylinder engines

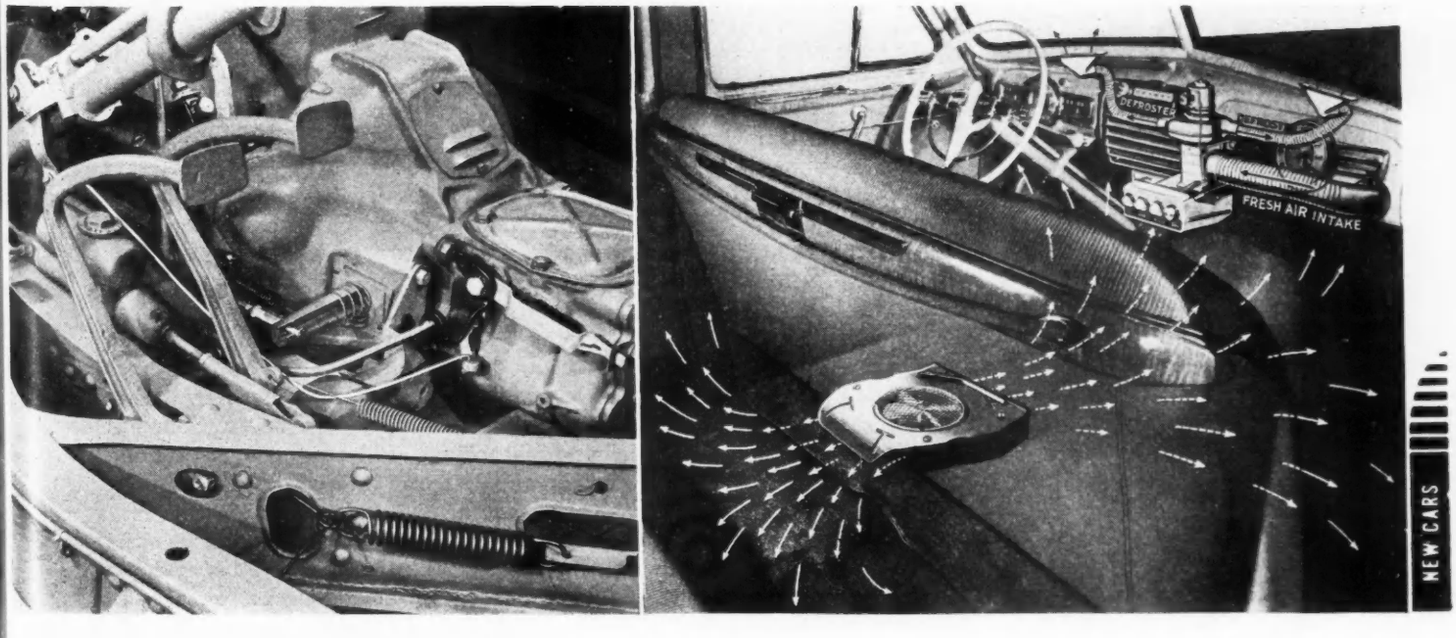
greater weight, greater stability with the wider frame and tread. The two-stage, variable rate rear springs have given a good account of themselves and are being continued.

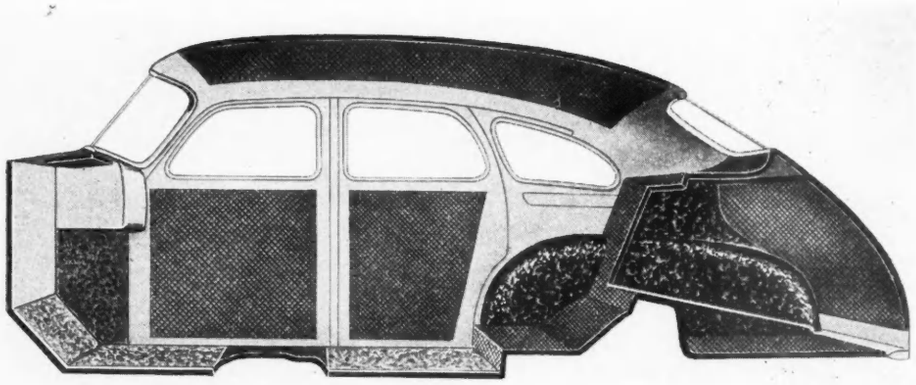
Important changes have been made in the powerplants. The Six has been increased ⅛ in. on the bore, now is 6-cylinder, L-head, 3 9/16 in. bore x 4 in. stroke, 239 cu. in. displacement, rated 90 hp. at 3500 r.p.m., an increase of 3 hp. The Eight remains the same, 8-cylinder, L-head, 3¼ in. bore x 3¾ in. stroke, 248.9 cu. in. displacement, rated 103 hp. at 3600 r.p.m. However the Eight is fitted with the dual carburetor as standard equipment and while the horsepower has not been stepped up, there is a marked improvement in torque at low speeds, contributing to faster acceleration in gear.

Compression ratio on both engines is 6.5 to 1, same as last year, with cast iron head. An optional cast iron head with compression ratio of 7.5 to 1, for use with premium gasolines, is available. The cylinder head on the Eight has an improved combustion chamber form with a different spark plug location.

Although the bore of the Six has been increased, the piston has been so designed as to maintain the same weight, despite an increase in strength. Oil economy on both engines is continued at a high level, with the

enters new selling year with three lines having interchangeable six- and eight-cylinder engines





View of 1941 Pontiac Streamline Torpedo body showing placement of insulation and deadening material

adoption of new oil rings and compression rings having an extra pound of tension.

Biggest story on the engines is found in the introduction of a full flow, built-in, permanent type oil cleaner located in the oil sump. All of the oil entering the suction side of the oil pump passes through this cleaner, precipitating dirt and physical impurities. The cleaner has no moving parts, nothing to adjust, is expected to carry on for the life of the engine without cleaning.

Referring to the drawing of the oil cleaner, it will be noted that it consists of a settling chamber concentric with an oil inlet tube, a die-cast upper housing at the top of the oil inlet tube, and a flat baffle just below the die casting.

All oil pumped to the bearings passes first through the screen which excludes large particles of dirt. It then enters the inlet pipe and flows against the inverted top which smoothly reverses its direction and causes it to strike the flat baffle where its direction is sharply reversed. At this point dirt particles are thrown out of the oil stream into the settling chamber where they gradually settle or precipitate until they rest on the bottom of the basin. After reversing its direction as it strikes the baffle, the oil is sucked into the oil pump inlet tube connected to the die cast cover.

The geared oil pump, too, has been redesigned in detail to effect better pressure control and to simplify servicing, eliminating the spring-loaded ball check valve used heretofore.

In the new pump, the pressure control is incorporated in the pump body, comprising a ¼-in. clearance chamber above the oil pump driven gear which is closed by a close-fitting steel disk resting directly on the gear. Pressure between the gear and disk is maintained by two small coil springs. As soon as pump pressure exceeds normal it lifts the disk against its spring pressure and permits oil from the pressure side to leak back across the top of the driven gear to the suction chamber.

While on the subject of the engines, it is of interest to note that in the new program—the interchangeability of the Six and Eight in the same chassis—the rear end mounting location of both engines has been made the same, the only change due to the differences in length being the use of a different radiator core and fan shroud. This makes it possible to use the same propeller shafts in all chassis regardless of the engine changes.

The Inland clutch is basically the same but the disk has been vastly improved by the introduction of four flat U-shaped springs which serve to center the plate perfectly without permitting a change in alignment in service. The clutch pedal is fitted with an over-center type booster spring to reduce pedal effort.

Engine bearings are new, precision type steel back babbitt, with a babbitt thickness of only 0.005 to 0.007 in., greatly increasing bearing life. Wrist pin bushings, too, are new, using a high grade aluminum-bronze alloy which is non-corrosive.

The exhaust heat valve thermostat now is located at the rear on both the Six and Eight where it will be more sensitive to temperature changes.

Transmissions and rear axles remain unchanged in basic detail. The gear shifting mechanism will be known as the Semi-Automatic Safety Shift, due to the proven effectiveness of the over-center booster spring linkage. In its present form this linkage relieves most of the shifting effort. In addition, the detent spring pressure on the shift rail has been made slightly lower, further contributing to ease of the shifting operation.

Mufflers have been altered in design by arranging the "swish" and "spit" chambers at the front end instead of the rear. It has been found that this promotes evaporation of moisture at the forward end, rejecting the moisture with the products of combustion, thus reducing rusting, and markedly increasing muffler shell life.

The steering gear worm now is burnished. Not only does this ease the steering action but it irons out all possible production differences from one gear to another.

At the front end suspension, the only important change is the provision for a wide range of camber adjustment, coupled with a decrease in camber. The tendency is to approach 0 deg. camber, the range being from plus ½ deg. to 0.

Brakes remain the same except for an improved type of lining. The handbrake has been improved greatly by a change in the linkage hook-up. The cross lever at the X-member now is housed completely within the X-member arms. A new type of brake drum has been adopted, featuring a full steel drum stamping with a centrifugally cast iron lining.

The cooling system has been stepped up in efficiency through the adoption of an arrangement termed the "radiator air trap." In the first place, the radiator

(Turn to page 259, please)

Design of High Speed, Two-Stroke Engines

By SCIPIONE TREVES, DSc., Mech. Engr.*

Section Six

This section relates to experimental and practical data on the design of two-stroke engines

THE THEORETICAL results obtained in Section V are fully confirmed by experimental values arrived at in investigations carried out by various firms in both Europe and America.

Fig. 15 shows curves of brake horsepower, brake mean effective pressure, mean piston speed, and of gas pressure at the blower outlet and the carburetor outlet (cylinder entrance) for an experimental two-stroke racing engine with opposed pistons, of the same cylinder dimensions as the experimental engine considered in the preceding sections and with an angular offset of 21 deg. between cranks. The power outputs, which were measured by means of a Heenan & Froude hydraulic dynamometer, are based on an atmospheric temperature of 43 deg. Fahr. For a speed of 6200 r.p.m. an output of 174 hp. is shown, which agrees well with the value obtained by calculation. The supercharging pressures, on the contrary, are slightly lower than those calculated. At maximum engine speed the pressure at the blower outlet was 1.4 atmospheres abs., and that at the cylinder entrance, 1.25 atmospheres. However, other tests, made under different atmospheric conditions, have shown charging pressures almost equal to those estimated for the purpose of the calculations.

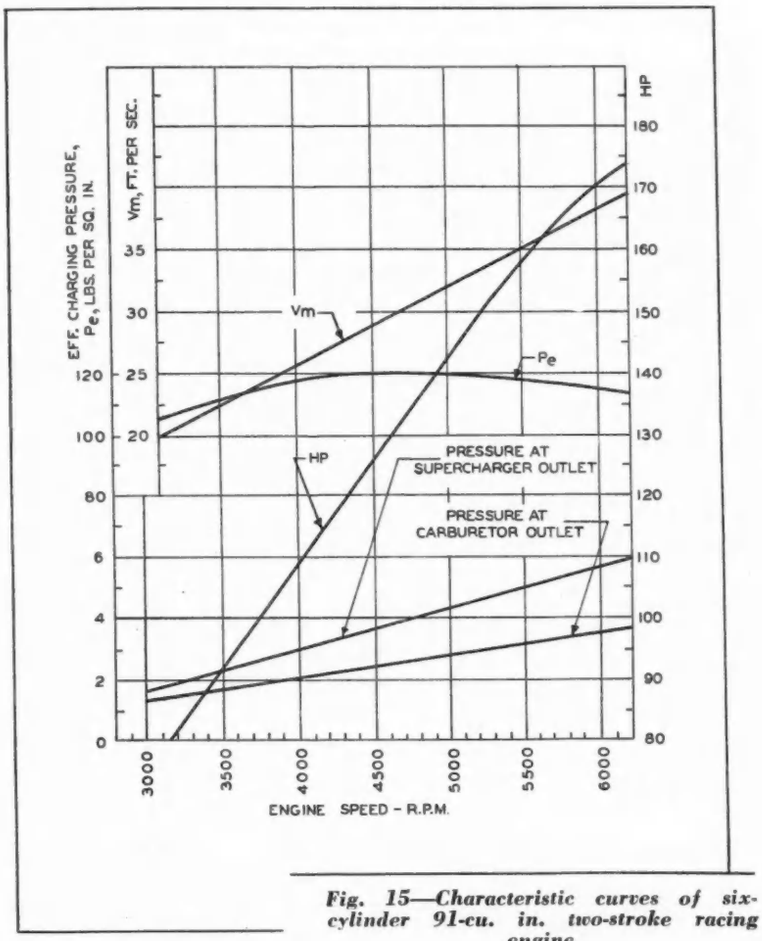


Fig. 15—Characteristic curves of six-cylinder 91-cu. in. two-stroke racing engine

Of particular interest is a study of the curves over the lower speed range, between 3000 and 5000 r.p.m., where very high b.m.e.p.'s and very high torques are obtained. It is unnecessary to go into an explanation why this is one of the most valuable characteristics of the engine. Another valuable feature is that the horsepower curve is almost a straight line up to the maximum power reached, which

* Formerly professor in the Royal College of Engineering, Turin, Italy.

ENGINE DESIGN

means that the torque is nearly constant throughout the speed range. This is particularly notable because it is well known that similar four-stroke engines have power curves with a very pronounced peak, and strongly-drooping torque and b.m.e.p. curves.

Quite naturally, the specific fuel consumption is very high, amounting to 0.83 lb. per hp.-hr.; but the oil consumption is reasonable, viz., 0.077 lb. per hp.-hr. The proportion of heat units absorbed by the cooling water is very low, as compared with other types of engine, varying between 1400 and 1600 B.t.u. per hp.-hr.

Of particular interest to the designer is a comparison of the port timing of this engine with that of the Duesenberg illustrated in Fig. 5, of which brief specifications were given in Section I. In the latter engine, in which the inlet ports are located opposite to, and are higher than, the exhaust ports, the former are placed in communication with the inlet pipe—by means of a valve rotating a half crankshaft speed—during the latter part of the down-stroke and the whole of the up-stroke of the piston. The design at first was worked out on the basis of motorcycle practice, where ports generally were of inadequate size, owing to lack of precise methods of calculation. Exhaust ports, the same as the inlet ports, extend over only one-third the circumference of the cylinder, and the height of the former was 7/16 in. (for a 2 5/16-in. bore), but it was increased repeatedly, at first to ½ in. With the first experimental cylinders it was impossible to operate at higher speeds than 3800 r.p.m.; with the second, which had exhaust ports ½ in. high, 4000 r.p.m. was reached, but this was still far below what was desired.

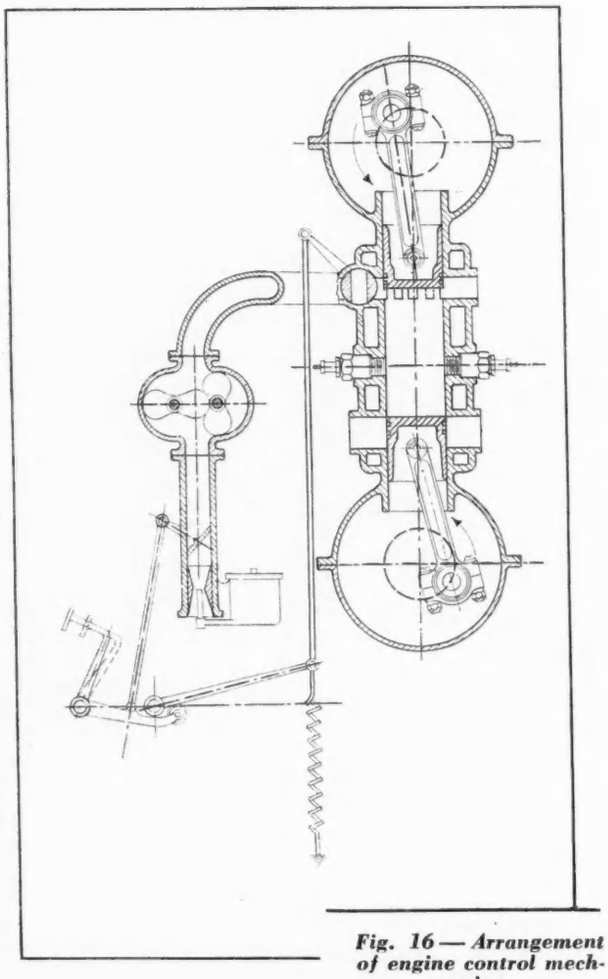


Fig. 16 — Arrangement of engine control mechanism.

Inlet ports in every case were made ¼ in. higher than the exhausts, to enable the blower to properly supercharge the cylinder after the exhaust ports had closed. Opening of the inlet port during the down-stroke of the piston was effected by the rotary valve when the exhaust port opening had reached a width of 3/16 in. If a timing diagram is drawn from these data, and the methods of calculation already described are applied to this engine, it is found that the inadequate port capacity, entirely aside from poor scavenging due to the non-employment of the uniflow principle, does not permit the engine to run at really high speeds and to give high specific outputs.

Moreover, the port dimensions in relation to the cylinder bore made it necessary to use a very high charging pressure to ensure adequate filling of the cylinders, which latter was the more important because so much of the displacement was rendered useless by the high exhaust ports. The supercharging pressure actually used was 7 lb. per sq. in. gage, or 0.492 atmospheres.

These drawbacks, which were clearly thrown into relief by tests, led to the conclusion that it would be well to increase the height of the exhaust ports to ⅞ in. (thus bringing the height of the inlet ports to 1⅛ in.), and to increase the supercharging pressure to 15 lb. per sq. in. or 1.0345 atmospheres.

It might be objected that the great heights of port, while giving port capacities closer to, but still materially below, the values shown to be necessary by thermodynamic calculations, owing to the small circumferential length of the ports, will result also in a great reduction of the effective compression ratio as compared with the theoretical one. Moreover, the use of very high supercharging pressures is open to the two-fold objection that a great deal of power is consumed in driving the supercharger and that a considerable portion of the incoming charge will be blown out through the exhaust ports, owing to the almost complete lack of stratification of the charge. It would seem, then, that the constitutional defects of this type of engine are impossible to overcome.

On the other hand, the timing diagram studied in Section IV for use with engines of very high speed is unsuited to engines operating at moderate speeds, say, below 3000 r.p.m. This difficulty may be overcome if it is possible for the operator to vary the angular offset of the crankshafts (as referred to in Section I), reducing it as the speed drops or eliminating it entirely for the lower speed range.

The problem of satisfactory idling characteristics is a particularly difficult one in the case of two-stroke engines. When the engine is equipped with a centrifugal blower, there is practically no blower pressure at idling speeds, hence there is no effective scavenging, and very little charge gets into the cylinder. Thus the Duesenberg engine could be made to idle steadily only at a minimum of one-fourth its maximum speed,

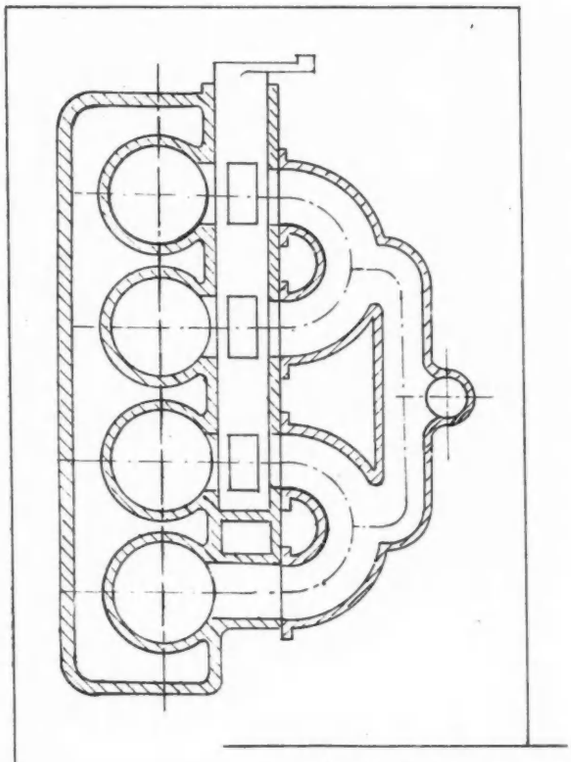


Fig. 17—Section through throttle valve in inlet passages

or 1000 r.p.m. In engines equipped with Roots-type blower the blower pressure does not drop off so sharply at low speeds. In any case, if the engine is of the double-piston type and, therefore, not provided with rotary valves, recourse may be had to a throttling device which, as the accelerator pedal is released, cuts off some of the cylinders from the source of mixture and keeps the supercharging pressure for the remainder of the cylinders sufficiently high to overcome the internal resistances.

The throttling device may consist, for instance, of a rotary valve (Figs. 16 and 17) connected to a multiplying lever or operated through a simple mechanism from the accelerator pedal during the latter part of its throttle-closing motion. The valve then will shut the inlet ports when the pedal approaches the idling position.

In the case of the double-piston engine the need for an adequate supercharging pressure, even at low engine speed, is based on somewhat different considerations. Here the inlet ports close later than the exhaust ports, and immediately after closing of the exhaust ports, the two pistons, approaching one another, try to force the remaining gases, which are not yet completely burned, out through the inlet ports, which are still partly open. Therefore, if the charging pressure were insufficient, some of these still-burning gases would get into the inlet pipe and carburetor, where they would cause a dangerous backfire.

This serious fault, which may raise the temperature of the inlet pipe to red heat in a few minutes and completely prevent operation of the engine, may result also—unless suitable preventatives are employed—from a sudden change in speed. Suppose, for example, that the blower is located between the carburetor and the engine, and that when the engine is operating at high speed, the throttle is suddenly closed. For a short time the supercharger, on account of inertia, will continue to rotate at high speed, but since its inlet is closed, the pressure in the inlet pipe will be much below atmospheric, with the result that burning gases will flow back into the inlet pipe and cause backfires.

A simple means of preventing this trouble consists of an automatic valve interposed between the throttle valve and the blower, as shown in Fig. 18. The spring on the automatic valve is so adjusted that the valve will not open as long as the vacuum in the inlet pipe does not exceed the normal value; but if the throttle valve is suddenly closed while the engine rotates at maximum speed, the automatic valve is lifted off its seat and admits air to the inlet pipe, with the result that the pressure in the pipe rises sufficiently to prevent backfiring. As the engine speed drops, the valve closes again gradually, and the engine continues to idle smoothly.

Another method of preventing backfiring under the conditions outlined consists in introducing a throttling valve into the inlet pipe close to the inlet ports. This eliminates the necessity of completely closing the throttle valve in the carburetor every time the engine power must be reduced, thereby ensuring maintenance of a supply of charge to the supercharger and of the neces-

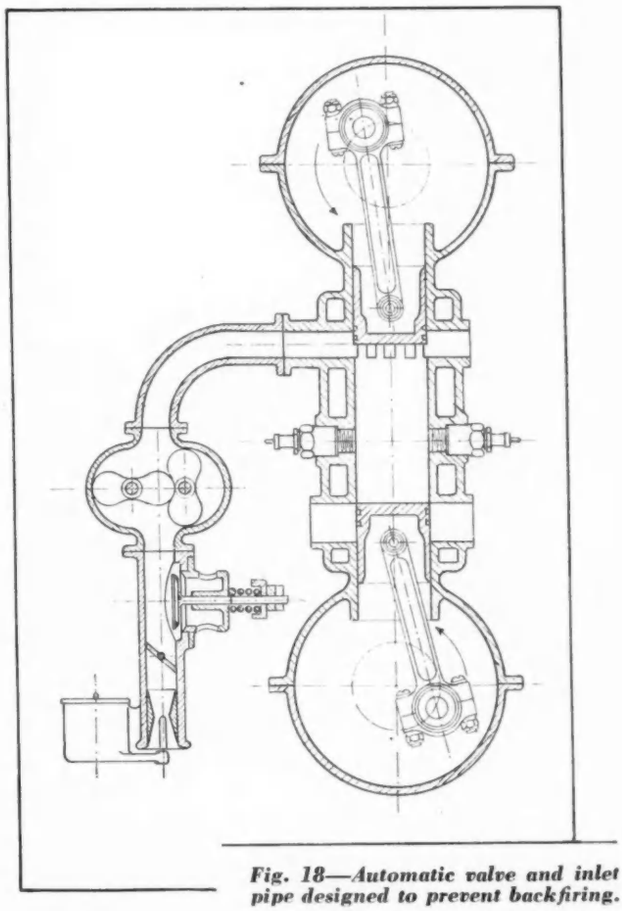
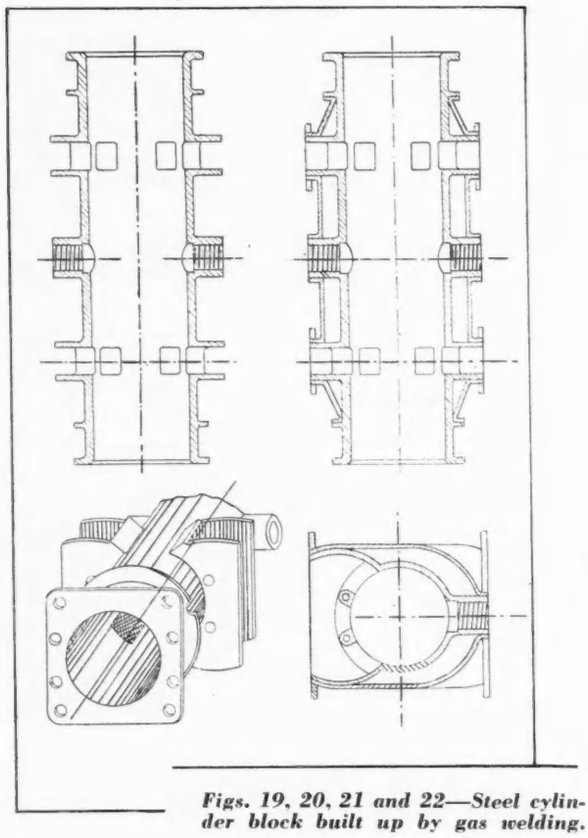


Fig. 18—Automatic valve and inlet pipe designed to prevent backfiring.



Figs. 19, 20, 21 and 22—Steel cylinder block built up by gas welding.

sary pressure in the inlet pipe to prevent backfiring. The throttling device may consist of a rotary valve like the one shown diagrammatically in Fig. 17, but extended to cover all of the cylinders, and so arranged that it partly closes as the engine is throttled down to a low speed. It should have provisions for adjustment. The opening section of this valve should preferably have the form of a circular sector, rather than that of a rectangle as shown, in order to ensure a more gradual opening.

Naturally, if the inlet ports extend over the entire circumference of the cylinder, as in the case of the engine calculated in Sections IV and V, there must be two inter-connected longitudinal throttling devices on opposite sides of the cylinders, both connected to the accelerator pedal.

From the foregoing discussion it may be seen that the requirements of the two-stroke engine—fundamentally different from those of the four-stroke engine, especially as regards the scavenging period—may call for the use of a carburetor without throttle valve, control functions being reserved to the throttling device placed close to the inlet ports.

In designing the details of a two-stroke engine, special care must be bestowed on the basic parts. As regards the cylinders, most designers make them of cast iron. Others, however, prefer to use individual steel cylinders machined from the solid block, as in the case of modern aircraft engines. This latter method, while unsuited to large-scale production, is more applicable under certain special conditions, where the cost factor is not so important, because it results in less weight and better cooling, since the cooling water comes closer to the heat-absorbing surfaces. Special care must be given to the design of the ports. The bridges must be made as small as possible in view of the strength required by the cylinder and the necessity for drill holes through them on the exhaust side for the cooling water. The bridges should be rather closely spaced, so the piston rings—frequent breakage of which is one of the most serious troubles experienced with engines of this type—may have sufficient support at the level of the ports and cannot drop into the ports and become deformed. In order to permit smooth passage of the rings from the position opposite the ports to that on the smooth continuous surface of the cylinder bore, and vice versa, it is advisable to round off the upper inner edges of the ports with a tapered milling cutter turning around an axis parallel with that of the cylinder. Attention was called in Section II to the necessity for rounding the other edges of the ports in the direction of gas flow.

The cylinder-bore surface should be as hard as possible, as it is subjected to hard wear by the rings rubbing against it, especially at the level of the ports. In the case of steel cylinders, the surface may be case - hardened sufficiently deep so that some case still remains after the cylinders have been ground. It is advisable to provide for two spark plugs per cylinder, if possible, for while this complicates the ignition mechanism, it is an advantage in the case of high-speed engines, because two simultaneous sparks will produce more rapid and more complete combustion, resulting in greater power. As to cooling, the special spark plugs manufactured for this purpose rarely cause any trouble, and although it might appear that the thermal stresses must be very much higher in the two-stroke engine, because of the greater frequency of explosions, experience has been that, other conditions being the same, the plugs behave better than in a four-stroke engine of similar type, provided arrangements are made to admit the fresh water from the radiator to the cylinder jacket in the vicinity of the exhaust ports and to cause it to flow from there to the spark-plug bosses. In any case, it will be well to follow present-day four-stroke practice and keep the spark points slightly below the surface of the combustion-chamber wall, to prevent overheating them.

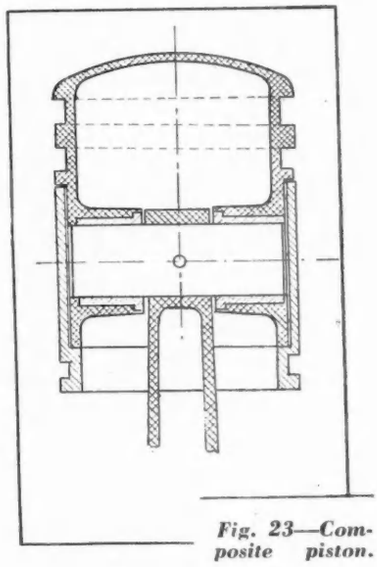


Fig. 23—Composite piston.

In Figs. 19, 20, 21 and 22 there is illustrated, dia-

grammatically, both in longitudinal and cross section, a special design of cylinder for a two-stroke engine, machined from a block by turning and boring operations, with a few extra parts added by gas welding. From Fig. 21 it will be seen that the first part of the inlet and exhaust passages consists of fittings made from the same block of steel, to which two suitably-shaped plates are welded at the sides. The jacket is made of two sheet-metal stampings, the two being first welded together with longitudinal seams, and then to the cylinder at the flange with which the latter is provided, as well as to the spark-plug bosses and to the inlet and exhaust ports, where the plates, the jacket and the flanges for the pipe connections are all welded together.

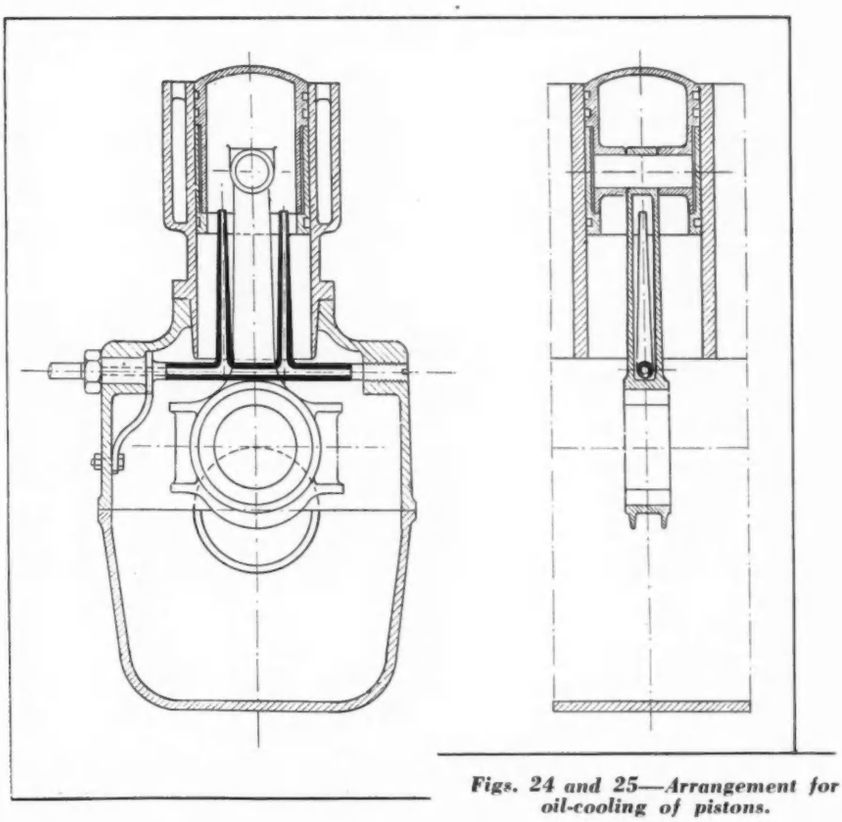
The choice of the type of piston is highly important since in these engines the pistons, in addition to their normal function, perform that of controlling the flow of the gases, both fresh and burned, which in four-stroke engines is performed by the valves. Besides, in a double-piston engine the pistons are subjected to extra-high thermal stresses, as they must transmit that part of the waste heat which, on account of the limited area of the jacketed part of the combustion-chamber wall, cannot pass directly to the cooling water. Finally, they must transmit to the cylinder wall the considerable side thrust due to the inclination of the connecting rods.

All these requirements must be satisfied, and at the same time the weight must be held as low as possible. However, the weight of the piston will always be materially greater than in a similar four-stroke engine, for the reason that it must be longer—sufficiently long so that when it is at the inner end of the stroke it does not uncover the exhaust port and establish communication between the exhaust pipe and the crankcase. The piston weight is still further added to if, as in the Duesenberg, a deflector is required on it, which must necessarily be higher than the quite high inlet ports, and, therefore, is easily overheated. Besides, the great height of deflector required makes it difficult to get a high-enough compression ratio. In the two-piston engine, on the other hand, while the piston controlling the inlet ports is cooled during each revolution by the column of cool, fresh gases entering through these ports, there is no such cooling effect on the piston controlling the exhaust ports, the crown of which is exposed almost continuously to the intense heat of burning or burnt gases.

It seems that best results are obtained with so-called composite pistons, as used in large-size, two-stroke Diesel engines. The piston crown is made of steel, which makes it possible to obtain the necessary strength with a thinner section and ensures good cooling if one or more jets of oil are directed against its under side by suitable means. This steel crown would be applied (Fig. 23) to a skirt of light alloy, being either screwed or bolted in place.

From the foregoing it will be realized that there is need for very intensive cooling of the piston crown, for if this is not provided, the heat absorbed has to pass off through a long path down the skirt and through the cylinder wall into the cooling water in the jacket. A direct cooling system may be provided, by means of oil sprays produced by the pump of the engine lubrication system, which in that case must be made considerably larger. Such cooling systems are used in Diesel engines of similar type, in which there are fixed or telescoping pipes ending in nozzles which when the piston is at the bottom of the stroke, come very close to the under side of the crown.

A somewhat different system is illustrated by Figs. 24 and 25. There the connecting rod is provided with a slot extending the length of its shank in the plane in which the rod oscillates. Then a pipe with two upwardly extending nozzles is passed through the slot in the shank and secured to the side-wall of the crankcase as shown. Oil from the pump of the engine lubrication system enters this pipe and is directed by the nozzles against the under side of the piston crown. Means must be provided to rotate the nozzle pipe in its supports and for locking it in position accurately, with the nozzles centrally in the piston. An objection to this last-mentioned system is that the connecting rod must be made longer than would otherwise be necessary, which increases the height of the engine



Figs. 24 and 25—Arrangement for oil-cooling of pistons.

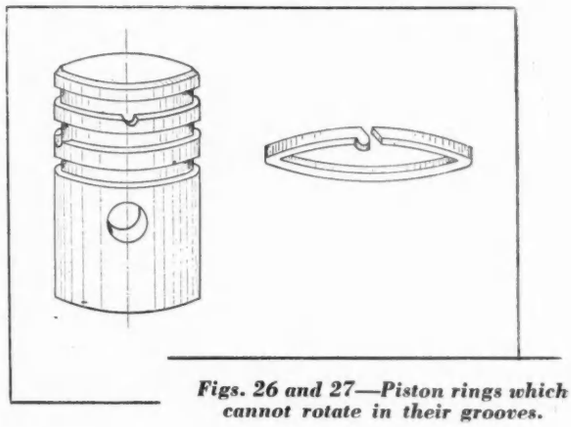
and adds to the weight of the reciprocating parts.

As regards the side thrust of the piston on the cylinder wall, in designing engines in which the exhaust ports extend over only half the circumference of the cylinder, it is well to choose a direction of rotation, or to locate the ports, so that the side thrust during the expansion stroke comes on the side of the cylinder wall opposite the exhaust ports. It is advisable in this connection to prepare and study a diagram of the forces acting on the piston, which are the resultant of the gas pressure and the inertia forces. This will show that, contrary to what happens in four-stroke engines, the load on the piston pin rarely changes in direction, and there is, therefore, an absence of that slight pumping action which serves to renew the oil film that is constantly forced out. There is, therefore, a tendency for the piston pin to stick, and this must be prevented by inserting bushings of special bronze or other suitable material into the piston bosses. The slight rotary movement of the pin, which is firmly fixed in the small end of the connecting rod by a taper pin, serves to carry oil to the bearing surfaces, an abundant supply of oil reaching the small end of the rod, which is located inside the piston.

In high-speed engines, four piston rings are generally used, arranged in two sets of two each. The rings should not be less than ⅛ to 9/64 in. wide, as they must be able to withstand the inevitable shocks from the edges of the ports. Moreover, they must not be able to turn in their grooves, as if they were, the gap in the ring might come opposite the ports, which would be likely to cause the free ends of the ring to catch and break. In conventional practice, turning of the rings in their grooves is prevented by small pins screwed into the wall of the piston, but this method is unsuitable for engines of very high speed, in which the pins wear out rapidly or get loose and cause the rings to break. For such engines, rings of special design, as illustrated by Figs. 26 and 27, may be used. These have a semi-cylindrical "appendix" which enters into a corresponding niche in the outer wall of the piston. These rings naturally are more difficult to manufacture, but since the locking means is integral with the ring, it cannot possibly get loose. Moreover, they may be made of such size as to exclude any possibility of breakage. To ensure a good seal, the gaps in the two rings of each set must be 180 deg. apart.

A locking device is necessary also for any oil rings that may be used, although oil rings are not so necessary in engines of this type as in others, inasmuch as the over-pressure in the combustion chamber tends to force the oil on the cylinder walls back into the crankcase. This statement is confirmed by the oil consumption, which, as already mentioned, is comparatively low (about 0.077 lb. per hp.-hr.) and by the fact that some designers have found it practical to do entirely without oil rings.

Connecting rods and crankshafts, which are usually made of alloy steel of from 185,000 to 200,000 lb. tensile strength, have no special features. In racing engines, on account of the high bearing loads, it is necessary to provide a roller bearing in the big end of the rod, and to fit the crankshaft with two counter weights for each crank, which balance all of the rotating masses, including that of the connecting rod. Main bearings, except possibly the front and rear ones, may be of anti-friction metal. In aircraft engines, on the contrary, whose speeds are limited to 4000-4500 r.p.m., in order to avoid difficulties in the arrangement of the reduction gear, counter weights on the crankshaft may be omitted and the big-end bearings may be made of anti-friction metal, but these bearings should be given a very rigid support. Particularly applicable to such engines are bearings in which the anti-friction metal is applied to two steel shells of best quality, with a fine-pitch thread turned in the surface to which the bearing metal must adhere. In any case, it is necessary to study the dynamic loads and the lubrication problems of main and connecting-rod bearings. To this end, polar diagrams of bearing loads should be drawn, and the mean and maximum values of the product pv (mean bearing load and rubbing velocity) determined, when plain bearings are to be used; while in the case of ball or roller bearings, the safety factor with respect to the maximum permissible load should be calculated.



Figs. 26 and 27—Piston rings which cannot rotate in their grooves.

As already mentioned in Section I, the mechanical balance of the engine would be perfect if it were not for the angular offset between the two cranks. This small offset, however, does not cause any serious disturbance, and if a diagram is drawn of the unbalanced inertia forces for each cylinder, it will always show these forces to be very small.

Any unbalanced forces and couples will be taken up on the crankcases, and if the latter are secured to the cylinder, on that as well. It is advisable to select a firing order which gives the best balance for each crankshaft considered by itself. For instance, in the case of a six-cylinder in-line engine with 12 opposed pistons, as discussed in Sections IV and V, the best firing order is 1-5-3-4-2-6.

Ignition may be effected either by the battery-and-coil system or by a high-tension magneto. In America, preference is given to the former system, which has the advantage (among others) that it gives a more powerful spark for starting. European designers, on the contrary, prefer the magneto. They generally select a type which turns at 1.5 times crankshaft speed and which is guaranteed by the maker for speeds up to about 10,000 r.p.m. When there are two spark plugs per cylinder, two magnetos are needed, each supplying

one row of plugs. The required spark advance is always very considerable, varying from about 45 deg. for a speed of 4500 r.p.m. to 60 deg. for 6000 r.p.m.

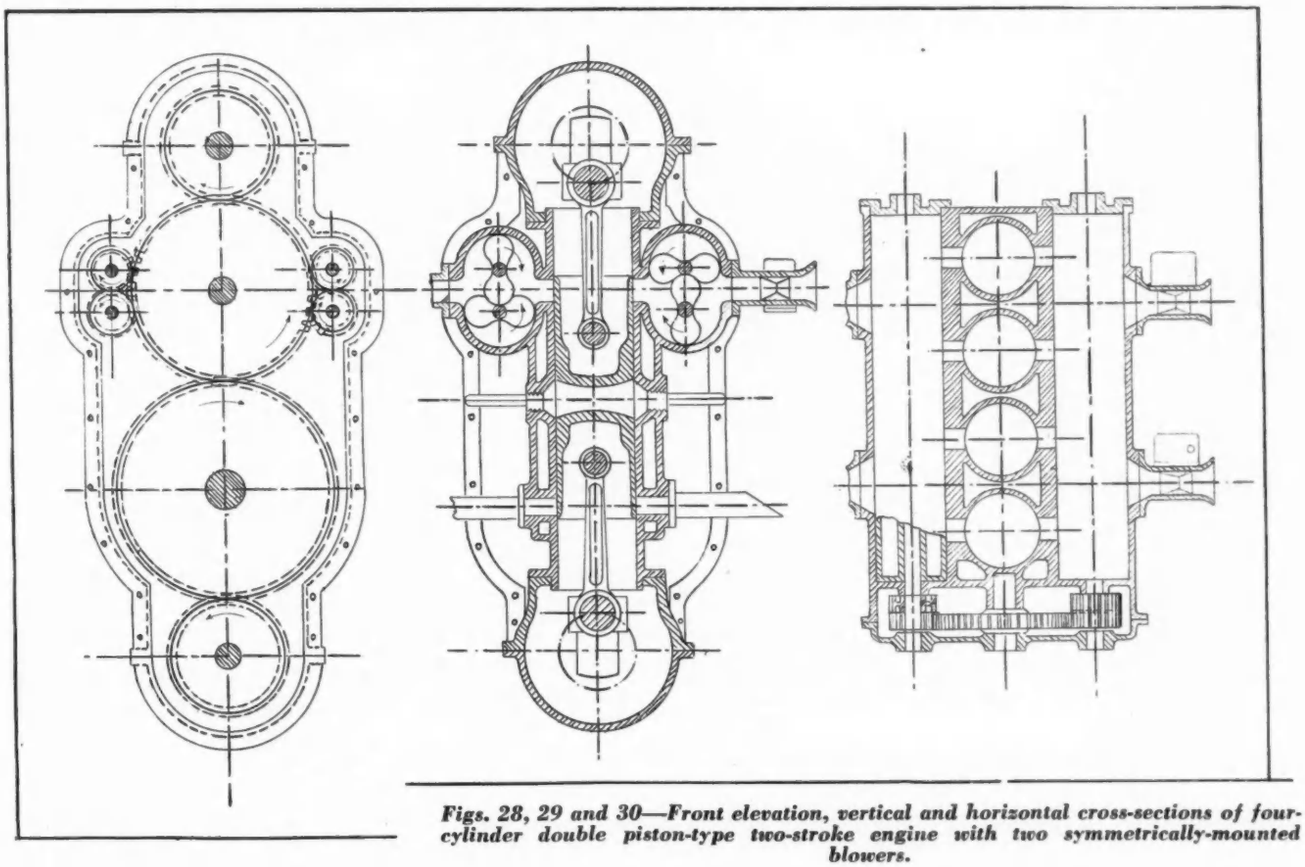
The gears which serve to connect the two crankshafts of a two-piston engine, and from which the power for a variable transmission or an air propeller may be taken, can, if subjected to normal tooth loads, be run at pitchline velocities of from 100 to 130 ft. per sec., without trouble.

The carburetor, which must be equipped with both a backfire valve and the usual throttle valve, may be located either ahead of or behind the supercharger. Advantages and disadvantages of the two methods are well known. It will suffice here to recall that with the second method the float chamber of the carburetor must be hermetically sealed and subjected to the pressure of the blower, and that gasoline must be supplied to it by a special pump. The self-adjusting type of pump, fitted with an elastic plunger, is well adapted to this purpose, and it, also, must be subjected to the supercharger pressure. However, positively driven pumps can also be used, if proper precautions are taken.

The blower must be driven from the engine directly, through a geared transmission, with a small clutch which will slip and prevent excessive stresses in the event of sudden acceleration or deceleration. In order to save space and weight, two large, best-quality-steel Belleville springs (instead of a single bulky coil spring) may be used for the clutch, the two together supplying the necessary load. The drive ratio between engine and blower is usually 1.1 or thereabouts, while Roots blowers are usually driven at 1.4 to 1.5 times crankshaft speed. Turbo blowers are unsuitable for engines of this type, which are so sensitive to anything interfering with a free exhaust. The clearance between the rotors and the casing of the blower must always be made quite liberal. In a Roots-type blower it should not be less than 0.012 to 0.016 in.

Engines equipped with a Roots-type blower can be started in a simple manner, especially if a mechanism for varying the offset between crankshafts is provided, though at first sight it might be expected that the great height of the ports would cause difficulties. On the other hand, to start the Duesenberg engine, which was equipped with a centrifugal blower, it was necessary to bring the blower up to a speed of 5000 to 6000 r.p.m. beforehand, by means of a separate electric motor.

There are no special requirements with respect to the inlet pipe. Of course, the same as in the case of four-stroke engines, sudden changes in cross-sectional area and in direction should be avoided, and uniform distribution aimed at. The blower may be so designed as to be of substantially the same length as the engine and its outlet ports may then register with the engine inlet ports, in which case there is no need for an inlet pipe (Figs. 28, 29, and 30). This completely eliminates loss in volumetric efficiency or power loss in the supercharger drive due to resistance to flow through the inlet pipe, and it also avoids contraction and expansion of the mixture and resulting condensation and lack of uniformity in the composition of the charge. With this arrangement, of course, it is impossible to



Figs. 28, 29 and 30—Front elevation, vertical and horizontal cross-sections of four-cylinder double piston-type two-stroke engine with two symmetrically-mounted blowers.

locate the carburetor between the blower and the engine. Besides, owing to the nearness of the blowers to the engine, a large amount of heat is transmitted to them, which lowers the delivery of the latter. Insertion and removal of the spark plugs also is more difficult, if the various parts are of the usual size.

In the design illustrated by Figs. 28, 29, and 30, the two blowers are driven by one of the two intermediate gears of the train connecting the two crankshafts. In mesh with this intermediate gear are pinions on the driving shafts of the two blowers, so that the latter rotate in synchronism but in opposite directions. As usual, the second rotor of each blower is driven from the first by enclosed gearing.

The exhaust pipe has a strong influence on the operation of any two-stroke engine. It may happen, for instance, that if an exhaust manifold of the type used in racing cars, that is, one without sudden changes in section and form, is applied to an engine which has previously been operating with an open exhaust, there is an immediate drop in output of the order of 20 to 25 hp. These pernicious effects, which sometimes may be reduced by slight changes in the length and form of the exhaust manifold, are dependent partly on the throttling caused by the exhaust ports, but chiefly on the energy of the column of burnt gases in the exhaust pipe. Oscillations in the gas pressure occur in that part of the exhaust pipe nearest the ports, and the frequency of these oscillations naturally depends on the length of the pipe.

This phenomenon results in a loss of power, which may be explained as follows: If at first the evacuation of burned gases is not accompanied by the admission of an equal mass of fresh mixture, on account of the back pressure of the burnt gases, when the remainder of the gas in the cylinder is expelled later on, the proportion of fresh charge in the out-flowing gas will be greater than it would have been if the evacuation of burned gas and admission of new charge had always proceeded at the same rate. In addition, these forward and backward movements of the gases in the cylinder tend to destroy, at least in part, the beneficial effects of stratification due to uniflow operation.

Sometimes, and especially if the required port capacities have not been accurately determined by calculation, there is a return of burnt gases toward the inlet pipe which, even if the resulting backfire through the carburetor does not stall the engine, is conducive to a very poor utilization of the inlet-port capacity, insofar as the exhaust gases, after having passed from the cylinder into the inlet pipe, must return to the cylinder through the same ports before fresh charge can enter.

This same phenomenon occurs in engines in which the inlet ports open before the pressure in the cylinder has dropped to that at the blower outlet. Some designers evidently believe it is better to increase the port capacity of the inlet beyond the point where the cylinder pressure equals the blower pressure at the moment of inlet-port opening, in spite of the fact that the port capacity in that case is not utilized to the full, as explained in the foregoing. This method, however, is inadvisable, both by reason of the disturbance it causes in the normal operation of the engine, and also because a return of burnt gases to the inlet pipe brings about a heating of the fresh charge, which should rather be cooled before it enters the cylinder, so as to increase the volumetric efficiency.

The fresh charge flowing through the inlet pipe also possesses a certain amount of kinetic energy, which latter in the cylinder will be transformed in part into potential energy (pressure), while the rest will be converted into heat by the eddying movements. It is thus possible, in accordance with Bernoulli's well-known theorem, for the pressure inside the cylinder to be greater than that at the ports.

Sometimes phenomena which are the exact reverse of that due to excessive exhaust pressure, referred to above, may be observed. Under specially favorable circumstances it may happen that the inertia of the column of burnt gases, aided by rapid cooling, creates a considerable underpressure in the cylinder almost instantaneously. The fresh charge is then violently sucked through the cylinder and carried directly into the exhaust pipe. In such cases it often suffices, in order to reduce the harmful effects of the inertia of the gases, to place a large expansion chamber near the exhaust ports, which can be accomplished in a simple manner by merely expanding the pipe. It is well known that these inertia effects are the basis of the operation of small two-stroke engines in which the exhaust pipe, shaped like a Laval nozzle, produces the vacuum or underpressure required for the induction of the fresh charge into the cylinder.

The foregoing is sufficient to show the importance —and at the same time the difficulty—of realizing and foreseeing the complicated phenomena which characterize the scavenging and exhaust periods of a two-stroke engine. At present a calculation based on estimates would give very uncertain results, and experiment continues to be the only reliable test for exhaust pipes.

With a view to studying the exhaust phenomena more thoroughly, it will be well to consider the entire engine from the blower outlet to the outlet of the exhaust pipe as a single outlet port through which the gases must flow and which is smaller in cross section than the inlet ports. Hence greater resistance to the flow of gases is offered by the whole engine than by the inlet ports alone. In this way, adopting a process similar to that employed by Rateau in a study of ventilation pipes, we may arrive at a definition for the resistance of the entire engine, or of its equivalent flow area, and from it derive a sound basis for a new theory of the two-stroke engine.

Section Seven

the concluding instalment will appear in an early issue

Pontiac for 1941 has Three Lines with Interchangeable Engines

(Continued from page 250)

grille now is a single assembly providing a clear entry of air across the front end between the fenders. In keeping with the modern trend, Pontiac has a stone shield at the front end between the grille and bumper. However, on Pontiacs this serves the added function of a front baffle which forces the entering air to stream into the grilles, instead of spilling under the front pan.

To further increase the effectiveness of the arrangement, there is a suitable fan shroud which collects the air stream with the aid of baffles extending from the extreme ends of the grille to the shroud.

The radiator core on the Sixes has slightly greater area to handle the increased power, but is somewhat thinner on the Eights due to improved air intake. Pressure cooling has been adopted, using about 4 lb. pressure.

Wheel and tire sizes remain as before.

Detail improvements in the electrical system include an automatic dome lamp which comes on and stays on while either one or both front doors are open. In addition, the lighting system which, in the past, has had circuit breaker protection for the major circuits will have local protection for the tail light, dome light, and stop lamps. Each of these circuits will have a separate load-rated fuse.

Because of the enclosed running boards on the new bodies, body floors are lower and wider than last year. This places the box-section sills well outside of the car frame side channels where they are supported on outrigger brackets riveted to the frame. At four spaced intervals, starting at the front door, reinforcements run crosswise of the body, are welded to the under side of the floor and provide reinforced areas where they intersect frame side members. At these eight points the floor is also bolted directly to the frame side bars for additional anchoring.

Front floor boards extend continuously across the body without any opening, thus increasing the rigidity of that section of the floor. This change also requires all servicing of the clutch and transmission to be undertaken from below the floor.

Body insulation has been greatly improved. Dash mats are 15/16 in. thick, which compares with 7/16 in. in 1940. Insulation in the form of rock wool now fills the space between cowl sides and cowl trim panels on either side of the toe board. Another advance in insulation is the solid well-ribbed, front floor which is completely covered with sound-deadening and temperature resistant padding. All this is in addition to the thorough job of insulation of roof, sides and floor.

The sliding sun visor is another innovation. Already movable in almost any direction, an endwise adjustment has been added so that the whole shade may be slid along on its hinge rod a distance of 3 in. A chrome-plated thumb screw clamp holds the shade at its desired adjustment.

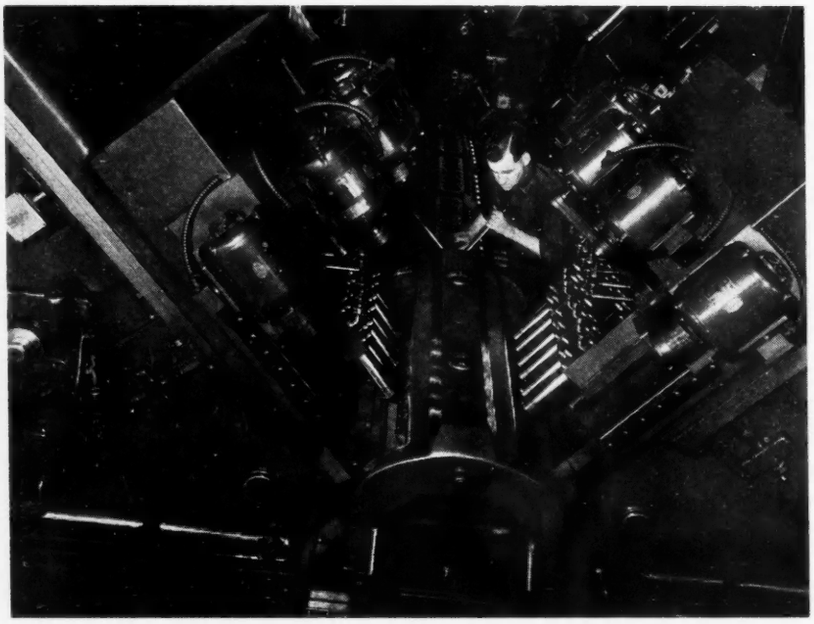
Plymouth Engine Stepped up for 1941

(Continued from page 246)

A new die-cast grille design, with Plymouth name plate, occupies the center of the board. At the left of this is a narrow, vertical panel to carry station selector buttons and other controls in radio-equipped cars. At the right is a similar vertical panel containing a completely-enclosed ash receiver. A spacious glove compartment is located in the righthand section of the board.

Choke and throttle buttons, light switch and illuminated ignition lock are directly under the instrument group on the front of the board. All controls are grouped under the wheel, where neither the driver nor the passenger can bump against them in case of sudden stops. The gearshift lever is located directly under the wheel. The standard manual type has a plastic handle that matches the wheel. Underneath the panel, at the driver's left, is the trigger-type hand grip for the parking brake, and also the control knob which unlocks the new one-piece hood. The dome light is located above the rear window, which is a large curved sheet of safety glass.

AT THE present time methane is being used as fuel for truck and bus engines in several European countries, notably Italy, and the suggestion has been made that it might be used also for airplane engines. The most difficult problem connected with its use for that purpose is that of the fuel tank. This problem has been under study and experimental investigation for several years. A report of the Aeronautical Research Committee issued in 1938 stated that the Royal Air Force of Great Britain had been studying the problem of carrying methane on the plane in liquid form and had designed and built an experimental tank of light alloy with double walls, with a layer of thermal-insulating material between the two layers. The tests showed that the loss of methane by evaporation was 1.6 per cent per hour, that methane would burn without detonation, and that the specific consumption was comparatively low.



A new fully-automatic boring machine installed in the machine shop of the Ford Motor Co.'s Lincoln division in Detroit. Tungsten-carbide boring of all 12 cylinders in the V-type Lincoln-Zephyr engine block is performed in one operation.

Grinding bucks in the new castings cleaning department at the Monarch Machine Tool Co.'s plant.

MEN

By H. E. BLANK, JR.

IN LINE with the progressive efforts of industry to improve factory working conditions, the Monarch Machine Tool Co. recently installed facilities in its plant at Sidney, Ohio, that eliminate the worst features of the work of grinding and sanding castings—generally considered one of the nastiest jobs among all metal-working operations. The new equipment, employing a downdraft ventilating system, also makes it possible to grind, spray-paint and sand the castings within a few feet of precision machining operations.

Rust, sand and other fine particles are exhausted through a large grating in the top of each unit. With the gratings for the large castings located on the floor and those for the small castings located at 16, 20 or 32-in. levels, the operators are never in a position to inhale dust or fumes, nor must they work in a bent-over position.

Of 14 working stations in the installation, 11 are for small castings and three for lathe beds and other large pieces. In the grinding section, the units include a two-wheel snagging grinder, a surface grinder for castings up to four feet square, and four grinding bucks, the largest being four feet in diameter.

There are two 4 by 8 ft. grilles in the small-castings paint department. Spray paint particles pulled down into these grilles are carried away by means of water solution and "eliminator packs" located underground. The equipment in the sanding department includes four grilles each five feet square. Water vapor is used in connection with a blower fan to eliminate the sand particles in the form of sludge.

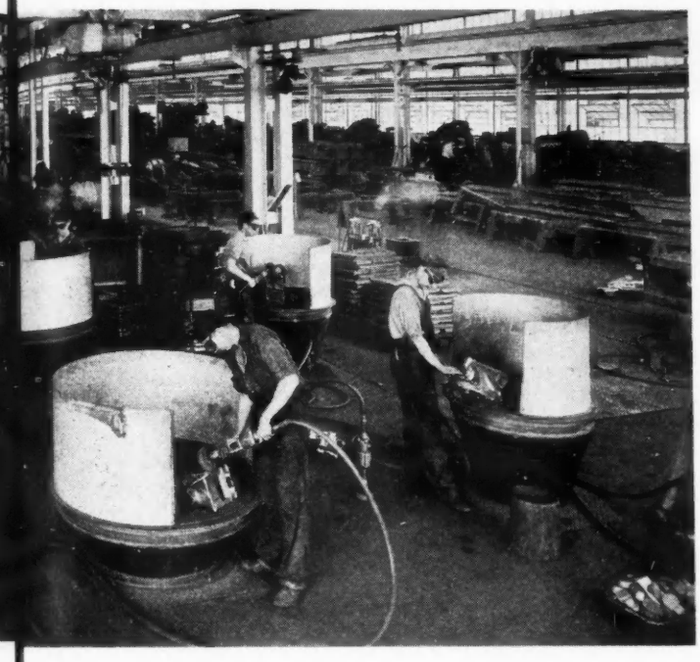
To facilitate handling of large castings, the three floor stations are connected by means of a 54-in. track. Heavy castings, mounted on a dolly, are moved on this track from the receiving department through the grinding, painting and sanding operations to the machining department.

All the units are exhausted through the roof. The two painting outlets are carried 30 ft. into the air to eliminate any possibility of the fumes re-entering the plant. Blower equipment consists of five "rotoclone" type fans.

THE Oilgear Co., Milwaukee, Wis., now is manufacturing two-way, three-position, electric controlled variable displacement pumps in conventional sizes from two to 150 hp. These new heavy-duty, radial, rolling piston type pumps utilize a high grade of oil as the fluid power medium. Practically each size is available with internal pumping mechanisms for normal working pressure ratings of 1100, 1700 and 2500 lb. per sq. in. and for peak pressures up to 3000 lb. per sq. in. All are arranged for flanged mounting to a separate reservoir base, or reservoir integral with the machine. They are fully equipped with built-in auxiliary gear pumps for super-charging the high pressure unit, for operating the pump control mechanism and for auxiliary purposes; a built-in relief valve for the gear pump; dual built-in reverse flow

high pressure adjustable relief valves which protect the machine and pump against overload; two-way automatic suction and discharge valve flanged integral with the pump case and flanged pipe connections.

It is possible to reverse the direction of oil flow and also select the neutral position at will from a remote pushbutton station, or by means of switches. Two opposing solenoids mounted on the pump control operate a built-in pilot valve. When one solenoid is energized, a preset volume of oil is discharged in one direction. When both solenoids are de-energized, the pump slide block moves to neutral position and no oil is delivered by the pump. Hand control adjustments provided on each side of the pump permit operator to preset the volume of oil to be delivered in either direction from zero to maximum. Inasmuch as the flow of oil is reversed in the pump, no external control valves are required and the installation is simplified. For example, when the pump is used in combination with a double acting cylinder on a hydraulic press, only two pipe lines are necessary to connect the pump and the cylinder.

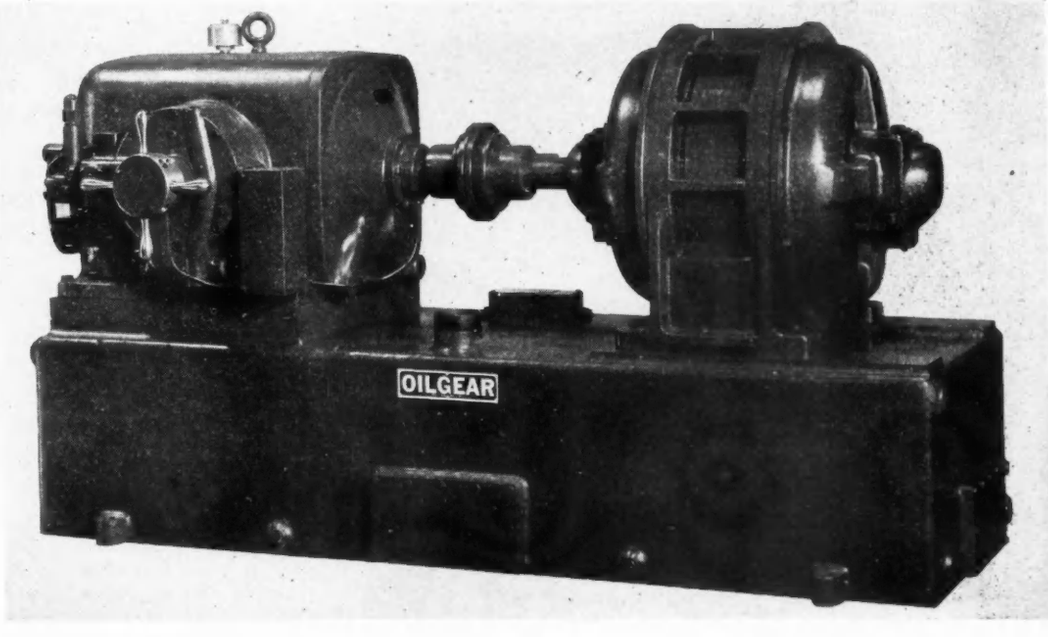


One of the six Oilgear Type "DX-10025" pumps recently built for operating large high-speed presses is shown herewith. This pump is mounted on a large reservoir base and direct connected to a 75-hp. electric motor. Oil delivered can be varied from 0 to 16,500 cu. in. (71.4 gal.) per min. in either direction at peak pressures up to 3000 lb. per sq. in. No oil is delivered when the pump operates in neutral.

Type "DX" pumps are being used as standard equipment on all styles of Oilgear broaching machines.

A HYDRAULIC press with a capacity of 1700 tons was built recently by the Lake Erie Engineering Corp., Buffalo. The huge machine exerts pressures of 900 tons on the blankholder and 800 tons on the main ram. Readers will note in the accompanying illustration that the vertical columns of the machine are

and MACHINES



One of the new Oilgear Type "DX-10025" pumps for remote pushbutton control of large high-speed presses. Oil delivery can be varied from 0 to 16,500 cu. in. per min. in either direction at peak pressures up to 3000 lb. per sq. in.

covered by flexible fabric boots. This provides protection against abrasive dust resulting from dressing dies.

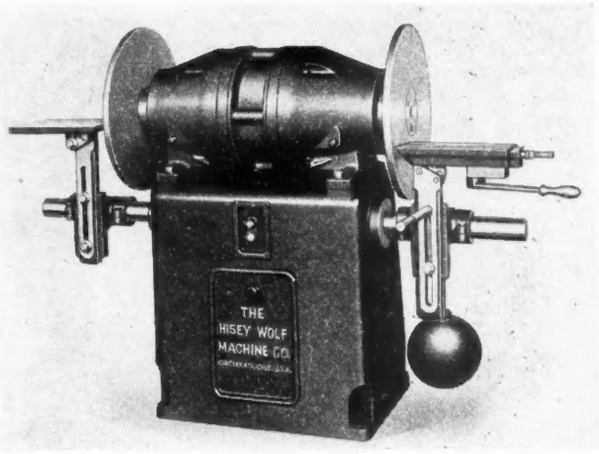
The press is self-contained with the pumping unit mounted on top. Its operation is controlled by centrally located pushbuttons. Adjustable pressure control of blankholder and main ram is provided. Essential specifications are: daylight opening, 98 in.; stroke, 37 in.; 160 in. by 106-in. bed equipped with cushion.

ANOTHER large hydraulic press recently announced is a 650-ton triple-action blankholder press built by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, for deep drawing gasoline tanks and other similar parts for the aircraft industry. Some of the features of the press are: accurate alignment of blankholder die ring rigidly supported by blankholder platen directly above; individual pressure adjustment of each blankholder ram, permitting the variation of blankholder pressure at six separate points, all three hydraulic actions function from only one H-P-M Hydro-Power type radial pump directly connected by one flexible coupling to one electric motor; H-P-M closed circuit operating system providing smooth action with valveless and shockless press reversal.

THE STANDARD ELECTRICAL TOOL CO., Cincinnati, Ohio, recently developed an infinitely variable speed buffing and polishing machine. It is claimed that the correct speed for each operation always can be obtained with any size or type of wheel. Change in speed is accomplished merely by turning a handwheel at the top of the machine. Each change of spindle speed is shown in r.p.m. on an indicating dial at the front of the machine and, although the full speed range is 1000 to 3500 r.p.m., the speed changer can be set for any intermediate speed range desired.

All of the equipment, including the speed changer, constant speed 1800 r.p.m. ball-bearing motor and magnetic starter, is enclosed inside a substantial base. The pushbutton station is located at the front of the machine. Removable louvered covers at sides and front and a removable cover at top front provide easy access to the inside of the base.

The equipment is available in 3, 5 and 7½ hp. sizes. Larger sizes can be furnished to order.



Improved design of Hisey-Wolf direct drive disc grinder.

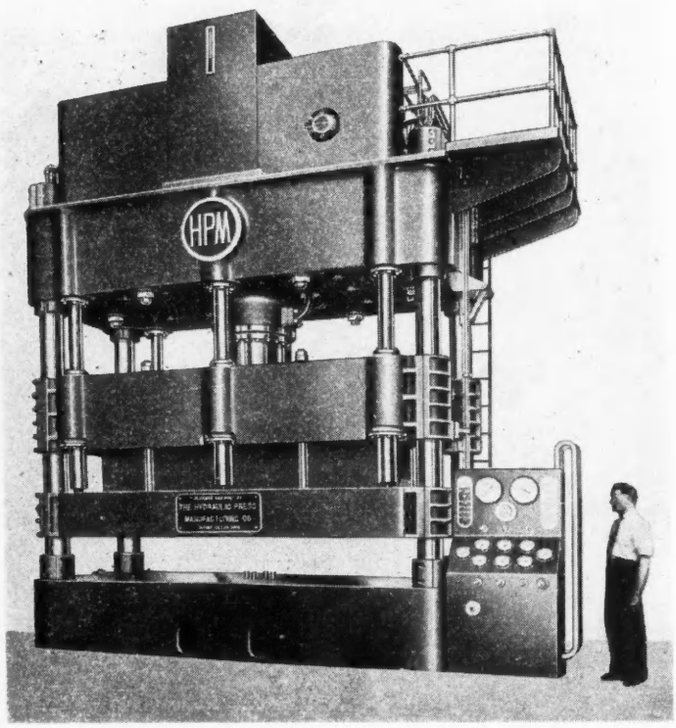
A CHANGE in design has been effected in the direct drive disk grinders manufactured by the Hisey-Wolf Machine Co., Cincinnati, Ohio. Extra heavy end bells with feet now are employed which carry the bearings directly behind the disks. The bearing construction has been improved, as has the method of lubrication. Oilers are of the constant level type with sight supply.

The motor of the new improved grinder is totally enclosed with a circulation of air passing through the motor, through the feet of end bells into the pedestal and back through the motor again. This, states the manufacturer, has the advantages of a totally enclosed motor with the added feature of cooler operation.

THE FOLLOWING new items of equipment have been announced recently:

Wilson Welder & Metals Co., Inc., New York, N. Y.—Dual voltage switch for installation on arc welding machines when they must be used on either of two line voltages at different times. It can be used on any motor employing AC current, provided the motor and starter are reconnectable for two voltages.

Stewart R. Browne Mfg. Co., Inc., New York, N. Y.—Storage battery emergency lamp intended for use where there is no electric cur-



A 650-ton triple-action blankholder press for deep drawing gasoline tanks and other similar aircraft parts. It was built by the Hydraulic Press Mfg. Co.

rent available or where it is hazardous to introduce long, power extension cords. It is identified as Model SB100.

Cutler-Hammer, Inc., Milwaukee, Wis.—Drum type master switch providing three-wire control for machine tools and other equipment. It affords functions equivalent to two and three button heavy-duty push-button stations and is offered for use where an operating lever is preferred. Ratings of the new switch are for pilot circuits up to 600 volts AC and DC.

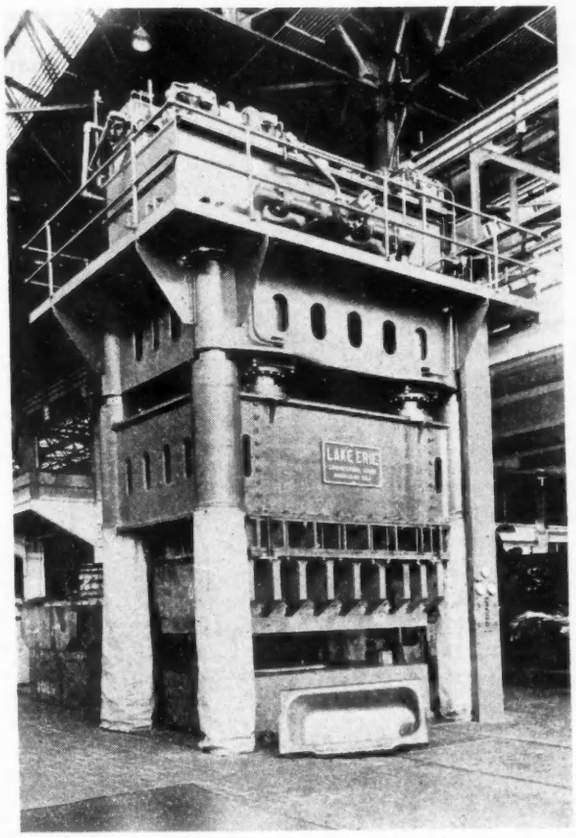
Bacharach Industrial Instrument Co., Pittsburgh, Pa. — A chemical type CO analyzer, tradenamed Fyrite. A feature is the gas sampling equipment which includes a primary fluefilter with a replaceable filtering thimble.

Morse Chain Co. & Western Mfg. Co., Detroit — Chain drive for installation on all types of machine tools. Advantages listed as follows: positive speed ratio, insuring accuracy of final speed governed by the transmission; lessened bearing friction due to characteristic slackness of chain drive; greater facility of changing speed ratio. (This is done by changing one sprocket and adding or removing quickly detachable chain links.)

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—A new twin lamp open end fluorescent luminaire designed especially for general or supplementary continuous strip lighting in low bay industrial areas. Available in two lamp spread distribution style and utilize two 40-watt, 48-in. fluorescent lamps. Known as Type FPC.

Eisler Engineering Co., Newark, N. J.—Long-horn spot welder No. 250-AA for deep sheet metal work. Available in three sizes: 5 to 25 KVA, 25 to 50 KVA, and 40 to 75 KVA with horn lengths of 30, 36 or 40 in.

Micro Switch Corp., Freeport, Ill.—Die-cast "Micro Switch" with roller type plunger and a castellated brass bushing which accepts the roller either longitudinally or cross-wise. The unit employs a small, single pole, snap action switch listed by Underwriters with a rating of 1200 watts up to 600 volts AC. The hub will accommodate standard ½-in. conduit.



Lake Erie Engineering Corp. built this 1700-ton double slide hydraulic press which exerts a pressure of 900 tons on the blank-holder and 800 tons on the main ram.

Elwell-Parker Electric Co., Cleveland—Fork truck, ERS-3T, capable of elevating loads on skids or pallets to three levels instead of one. At the operator's will, forks can be raised to 50½ in. on the first lift, to 88½ in. on the second, and to 112 in. on the third. Rate of upward travel is 20 ft. per min. with a 1500-lb. load. With telescoping members lowered, the over-all height of the truck is 74 in.

Lyon Iron Works, Greene, N. Y. — A 10,000-lb. capacity hydraulic elevating truck for unloading coils of strip steel from recoiling machine. It is arranged to run on a track at approximately floor level with the lower portion of the truck in a pit below floor level.

Colonial Broach Co., Detroit —New "Senior" line of general purpose hydraulic presses for operations, such as assembling and broaching. These machines are available in seven sizes, as follows: one ton, 18-in. stroke; three-ton, 18- or 24-in. stroke; six-ton, with 24- or 36-in. stroke; and 10-ton, with 30- or 42-in. stroke. Floor space required by the one-ton model is 18½ by 30½ in., with 29 by 51 in. for the largest model.

All units in the "Senior" line can be furnished with controls to stop operations at top or bottom of the

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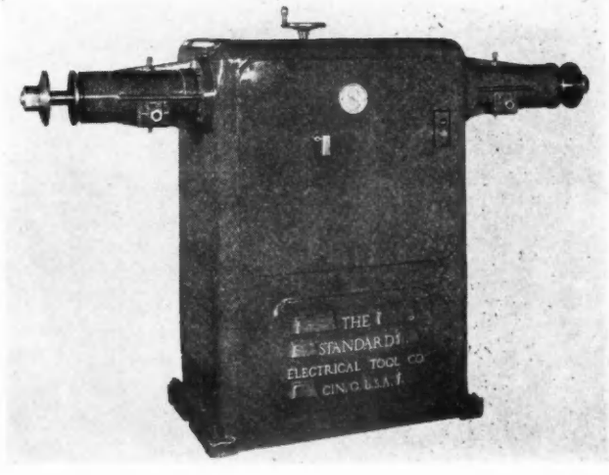

Infinitely variable speed buffing and polishing machine which has been added to the Standard Electrical Tool Co.'s line.

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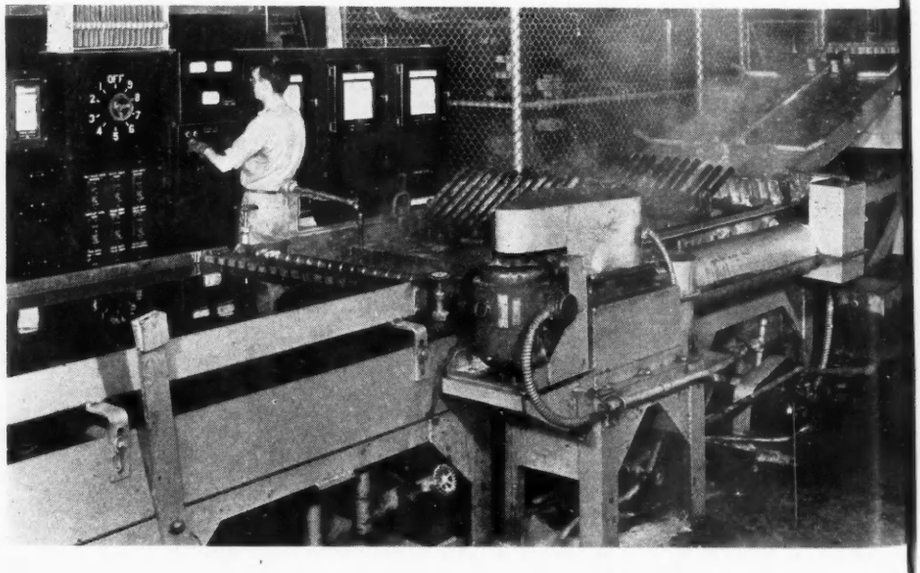
J & L Produces Spring Wire By An Electric Direct Resistance Method

Contrasting with conventional methods of heating wire to quenching temperatures, either in furnaces or by immersion in molten baths, a new process in which electric current is passed through the wire to heat it to desired temperature is employed by the Jones & Laughlin Steel Corp., Pittsburgh, to produce a new product known as Electromatic Oil Tempered Spring Wire.

Equipment developed for processing the wire handles a wide variety of gages. It is so constructed that wire fed from reels passes first through tension rollers, then through a molten electrical contact, and finally to a second molten contact to complete the circuit through the wire. These contacts are held at a constant predetermined temperature, the second serving as a primary quenching bath from which the wire passes to an oil bath for the final quench. The double-phase quenching feature provides a gradual reduction in wire temperature, thereby preventing the steel from being "shocked" by a sudden drop in temperature. Continuing from the final quench through a molten tempering bath, the wire is reheated to give it the desired physical properties and fatigue values. It may then be passed through a light soluble oil bath prior to shipment.

Jones & Laughlin states that the fundamental advantage of the process is the exactness by which all factors affecting the ultimate quality of the wire are controlled. Constant flow of electric current of controlled voltage and amperage fed into the wire, together with the closely regulated speed of the machines, governs heating the wire to within exact limits. In addition, thermocouples in all contact, quench, and temper baths provide automatic temperature control over these units. The resulting combination of accurate time and temperature regulation makes possible precise control of the heating and quenching cycle.

Inasmuch as length of heating time and control of quenching temperatures have a direct effect on grain structure, this method makes it possible to control and reproduce desired grain sizes with high accuracy. The double-phase quenching provided has been found to improve considerably the physical characteristics of the wire, and makes possible a close control of tensile strength, elastic limit, elongation, and Rockwell values. Also, it is possible to control decarburization and scaling to narrow limits.



Processing equipment employed by the Jones & Laughlin Steel Corp. in the manufacture of its new Electromatic Oil Tempered Spring Wire.

Aircraft Instrument Panel Now Molded of Monsanto Polystyrene

An instrument panel molded of polystyrene is used by Aeronautical Corp. of America on its newest private plane design — the Aeronca Super Chief. The panel, believed to be the largest injection molding of polystyrene, was produced by the Metal Specialty Co. and Thermoplastics, Inc.

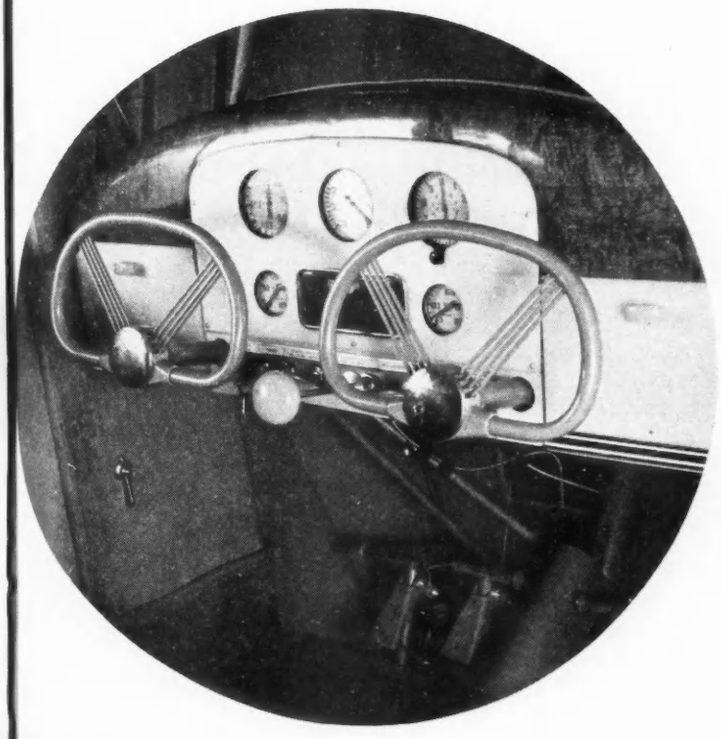
Polystyrene is a product of the Plastics Division, Monsanto Chemical Co., Springfield, Mass. The plastic can withstand extreme conditions of humidity and temperature which latter, in this particular application, may vary from 120 deg. down to 30 or 40 below zero. In addition, Monsanto polystyrene has very low specific gravity and high impact strength, both important characteristics of a material for aircraft application.

Improving the Bond in Composite Bearings

Where steel backings are to be lined with babbitt metal, it is customary to first tin the steel, in order to ensure a dependable bond. Sometimes alloy steel is used for the backing, and this, as well as cast iron, is

Automotive Materials

difficult to "tin." In such cases the best results are obtained by depositing a thin adherent coating of copper on the steel before tinning. In order to effect a good bond between the intermediate layer of copper and the steel, it is necessary to etch the shells anodic-



Aircraft instrument panel molded of Monsanto polystyrene.

ally before plating them. The following method of doing this, which is said to have given excellent results in the laboratory of the International Tin Research and Development Council, is described in the Council's periodical *Tin and Its Uses* for July.

Shells are first "degreased" by "stoving" at a suitably low temperature so that their physical properties are not affected. This means that the cutting oil used must be one that is readily volatilized. A mineral oil can be removed by immersion in the vapor of trichlorethylene, but it is better to use a soluble cutting oil that can be removed in a hot caustic cleaner. A suitable caustic bath, used boiling, consists of an aqueous solution of the following composition:

	Ounces per gallon	*Grams per litre*
Washing soda	6	37.5
Caustic soda	2	12.5
Trisodium phosphate	2	12.5
Sodium metasilicate	2	12.5

A few minutes in this bath will remove soluble oils, but an hour or two may be necessary for mineral oils, although some proprietary detergents with good emulsifying properties are able to remove them in five or ten minutes.

Cathodic degreasing using a boiling alkaline bath is also very effective. The boiling alkali is contained in an iron pot connected to the positive pole of a 12-volt source of current; the negative pole is connected to the bearing shell. The rapid evolution of hydrogen assists in blowing off the grease.

The degreased shells are joined by a stout cable to the positive pole of a source of current at 12 volts. The other pole is connected to a lead-lined tank containing 50 per cent cold sulphuric acid (Sp. Gr. 1.40). The shells are lowered into the acid and a current of very high density is passed. At first the surface of the shells blacken, but after a quarter of a minute it clears to a silvery-gray and begins to evolve oxygen freely. When this occurs the shells have been adequately etched.

The shells are removed from the etching bath, rinsed and transferred to a cyanide copper plating bath of the standard type. A layer of copper from 0.002 to 0.003 in. thick should be deposited and this will usually take from one to two hours.

The copper-plated shells are now ready to be brushed with flux and immersed in the tinning bath. Copper tins very readily at between 460 to 480 deg. Fahr., and this temperature range should not be exceeded, because of the risk of dissolving the copper coating and exposing the non-tinnable steel or cast iron underneath.

A New Material for Gaskets

A new material for cylinder-head and other gaskets has been developed in Germany to take the place of asbestos-base gaskets (asbestos being a material not readily obtainable in Germany under present conditions). It is made up of three sheets or layers of the snythetic rubber Buna and two layers of steel-wire netting, the wires of the two layers being placed at angles of 45 deg. with each other. Wire netting and rubber sheets are vulcanized together. Where the conditions of application make it desirable, metallic edging

may be applied where the gasket is exposed to high pressure. Unlike natural rubber, which softens when exposed to high temperatures, Buna has a tendency to "tighten," and it can withstand high temperatures much better than natural rubber. Owing to the elastic nature of the rubber and the fact that the gasket is not coated with graphite, it is said to have better holding properties than conventional gaskets. The new gaskets are said to be resistant to hot water and hot oil up to 350 deg. Fahr., to glycol, gasoline, and leaded gasoline. They are not destroyed by adhering to the metal parts.

Valve-Spring Design Data

THE PROBLEM of designing valve springs for high-speed engines was discussed at considerable length in a paper on "Some Problems We Meet," by L. H. Dawtrey, technical assistant to the chief engineer of Standard Motor Co., Ltd., in *The Journal of The Institution of Automobile Engineers.*

Mr. Dawtrey designs springs on the basis of a stress of 70,000 lb. per sq. in. at full lift and a vibration frequency of at least 20,000 oscillations per minute. The frequency of oscillation of the spring he determines by the equation

$$P = \sqrt{\frac{62.4\ d\ p\ \sqrt{G}}{R^2\ l}} \text{ cycles per minute,}$$

where d is the wire diameter in in.; p, the pitch of the coils in in.; G, the modulus of rigidity; R, the mean radius of the coils, and l, the effective length of the spring in in. He says it is desirable to provide a factor of safety against fatigue greater than unity, with the coils of the spring completely closed in surge. Springs designed in accordance with these rules always withstood very severe endurance tests. Such springs are short, have few coils, and are of light gage wire. The number of free coils is sometimes as low as four.

For any particular choice of stress and vibration frequency, the total deflection of the spring will be the same, no matter what its diameter may be. In the case chosen, of 70,000 lb. per sq. in. and 20,000 oscillations per minute, the spring will have a deflection from free length to full lift of 0.81 in. This is based on conventional formulae and neglects the Wahl factor for stress in coiled springs, a comparatively recent innovation. Where possible of attainment, higher vibration frequencies and lower maximum stresses should be aimed at, with preference for high vibration frequency rather than low stress. The spring should be designed to compress to within 1/16 in. of complete closure of coils at full lift, and under these conditions a factor of safety against fatigue of over unity should be attained. This is calculated on the stress range from closed position of the valve to complete closure of the coils.

Two simple formula result from the above rules. First, the wire diameter is given by

$$d^3 = \frac{WD}{27{,}450}$$

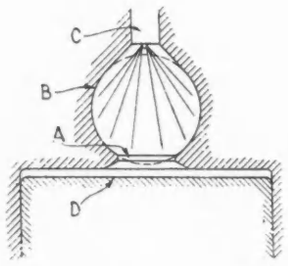
where W is the spring load at full lift, calculated to prevent valve clatter at maximum speed, and D is the mean diameter of the coils, in in. The number of free coils in the spring should not be greater than

$$n = 42.25\ \frac{d}{D^2}$$

These values being set, the spring rate can be calculated. Generally it is less than the maximum allowable by the cam form, and it is advisable to reduce the number of coils until the rate becomes the maximum permissible, for the stiffer spring will have a higher surge frequency and thus will be less likely to fail through fatigue.

Diesel Combustion Chamber Facilitates Starting

ONE OF the objections to the swirl-type of combustion chamber for Diesel engines is that the swirling motion tends to cool the charge contained, thereby retarding ignition and giving heavier explosions. Also, because the temperature of the core of the swirling charge is lowered, starting from cold is made more difficult. To make starting easier, the hot core of the charge in the combustion chamber should be maintained. A patent has been issued in Great Britain on an application from Maschinenfabrik Augsburg-Nurnberg (MAN) on a combustion chamber which deviates as little as possible from the spherical form and in which the conical extension of the chamber to the

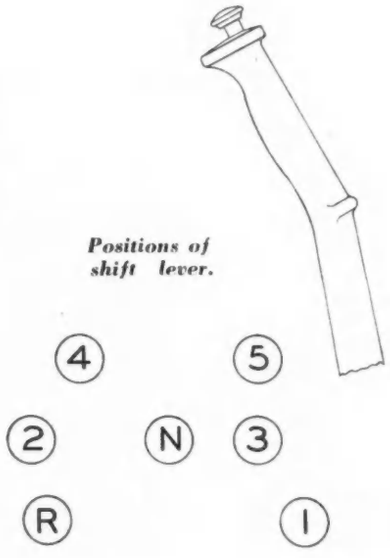


New MAN combustion chamber

nozzle and the throat between the combustion chamber and the cylinder are short and in axial alignment with the center of the sphere. The throat is circular and of approximately one-half of the diameter of the sphere, which is said to avoid agitation during compression and to produce strong agitation during combustion. The drawing herewith (reproduced from *The Automobile Engineer*) shows the proportions. The arrangement appears to be the exact opposite of that of the turbulence-chamber engine in which the air enters the chamber tangentially and is set into a strong swirling motion thereby.

BROWN-LIPE FIVE-SPEED TRANSMISSION FOR MOTOR TRUCKS

Longitudinal Section



Positions of shift lever.

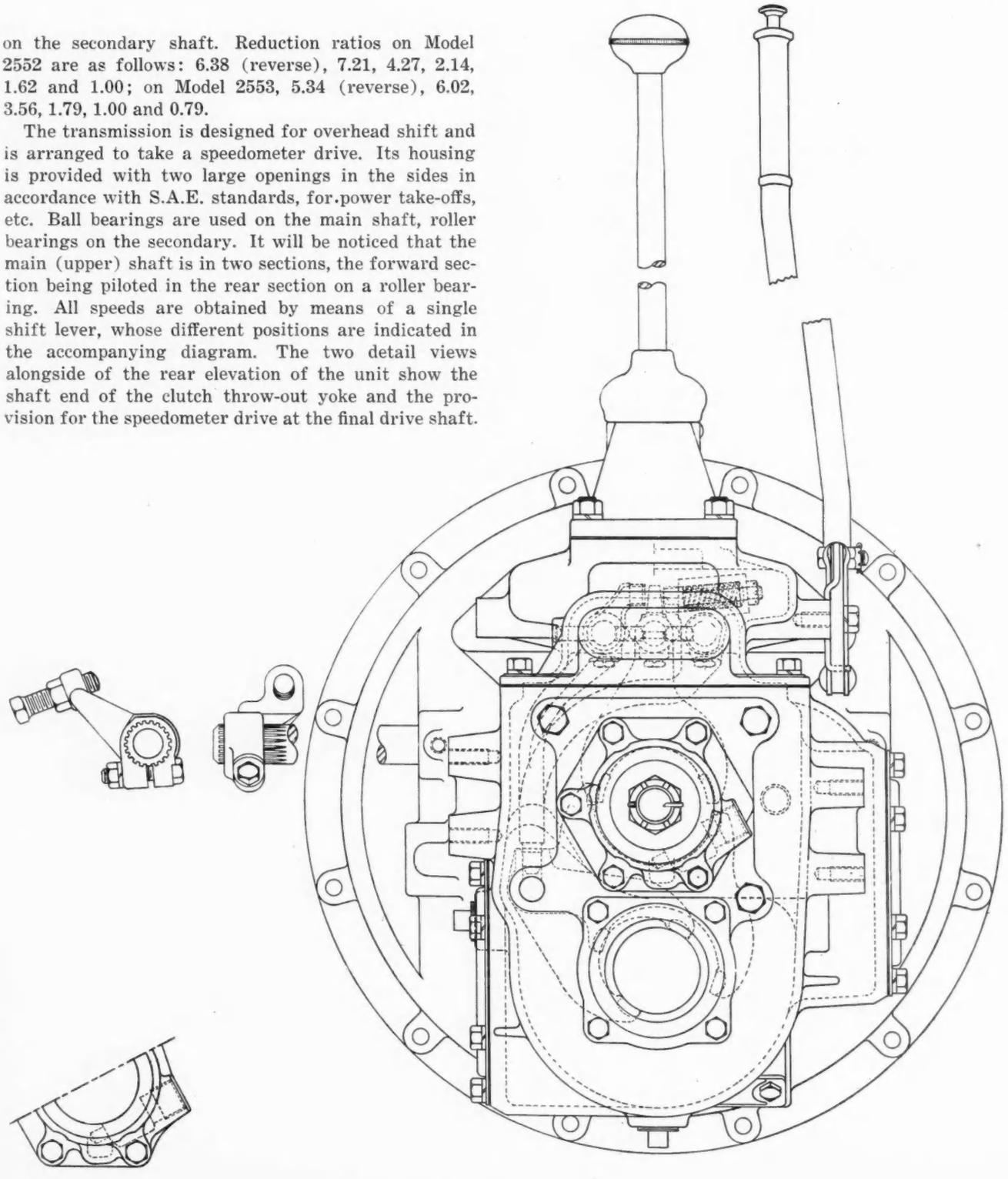
The drawing on this page shows a longitudinal section and that on the back of this page a rear elevation of a five-speed gear transmission with friction clutch which is being manufactured by the Brown-Lipe Gear Division of the Spicer Manufacturing Corp. The transmission is made in two models, Model 2552 having a direct-drive fifth speed while Model 2553 has a direct-drive fourth speed and an overdrive fifth speed. It will be seen that the friction clutch is of the regular Brown-Lipe type in which the pressure of the helical clutch spring is transmitted to the clutch pressure plate by numerous flexible levers, which tends to obviate concentration of pressure on the clutch disk. There is a sliding gear on the secondary shaft which can be meshed with the smaller one of two first-reduction pistons. Other gears that normally are free on their shafts can be locked thereto by means of sliding clutch collars, of which there are two on the primary and one

BROWN-LIPE FIVE-SPEED TRANSMISSION FOR MOTOR TRUCKS

Rear Elevation

on the secondary shaft. Reduction ratios on Model 2552 are as follows: 6.38 (reverse), 7.21, 4.27, 2.14, 1.62 and 1.00; on Model 2553, 5.34 (reverse), 6.02, 3.56, 1.79, 1.00 and 0.79.

The transmission is designed for overhead shift and is arranged to take a speedometer drive. Its housing is provided with two large openings in the sides in accordance with S.A.E. standards, for power take-offs, etc. Ball bearings are used on the main shaft, roller bearings on the secondary. It will be noticed that the main (upper) shaft is in two sections, the forward section being piloted in the rear section on a roller bearing. All speeds are obtained by means of a single shift lever, whose different positions are indicated in the accompanying diagram. The two detail views alongside of the rear elevation of the unit show the shaft end of the clutch throw-out yoke and the provision for the speedometer drive at the final drive shaft.



NEWS OF THE INDUSTRY

Warns That Private Capital Should Not Be Discouraged

Knudsen Testifies That Industry Will Do More Than Its Share In U. S. Defense Program If Free of Government Domination

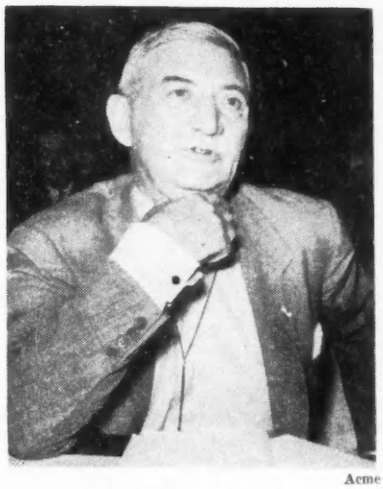
Members of the National Defense Advisory Commission, led by William S. Knudsen, asked the Senate Finance Committee on Sept. 4 to strike from the excess profits tax bill a House provision under which the government would have some control over future disposition of new industrial facilities after the passing of the emergency. Members emphasized while testifying before the committee that private industry would do more than its share in producing defense material provided it could have assurances against any form of government domination, and that the country would snap back to pre-war conditions.

Referring to the House provision as "a radical new departure," Mr. Knudsen said:

"As I understand the effect of the added provisions, any business which expended its private funds for the erection or construction of required new facilities would, in order to secure the deductions recommended by the subcommittee, be compelled to give a consent that it would not destroy, demolish, impair or substantially alter such emergency facilities without the consent in writing of the Secretary of War or the Secretary of the Navy.

"Further, by refusing consent, the government would be in a position to acquire the property at not the then fair value of the private business, but at the so-called 'adjusted' basis, which is the original cost, less tax deductions, and which in many cases would be some nominal sum not less than a dollar."

It was Mr. Knudsen's observation that under such a provision where owners of emergency facilities agreed on the proper tax treatment, the disposition of the property, though constructed with private funds, would be placed directly under the control of the government. He likewise emphasized that the provision would discourage the investment by private capital in defense facilities with resultant unnecessary burden on government funds; and that it would tend to put a stop to beneficial results expected from the amortization provision of the pending tax bill.



Acme

W. S. Knudsen

. . . shown as he testified before the Senate Finance Committee on Sept. 4 that the House-approved excess profits bill would hamper seriously the U. S. rearmament program

He joined other representatives of the commission in recommending that the disposition of new plants built by private capital as an essential part of the defense program be made the subject of contract negotiations between the government and industry.

Mr. Knudsen, who told the committee that during a recent inspection trip of industrial defense facilities he found private manufacturers were showing the greatest concern over the amortization provisions of the tax bill, testified that if Congress passes "a legitimate five-year amortization plan" the commission will have no trouble in placing contracts for all the government's defense necessities.

"I consider the defense program good insurance for our country in these uncertain times," the former General Motors executive said in expressing his personal opinion on the excess profits tax proposal. "I believe that a substantial part of the cost should be assessed against us now by equitable taxation of individuals and corporations.

"I assume that you intend this to be an excess-profits tax law as its name implies. That seems to me to mean a tax on the excess profits which may flow to various companies directly or indirectly as a result of the defense program. Consequently, it seems fair that this should be a tax on earnings above their normal past record and not a tax based solely or largely on earnings

(*Turn to page* 280, *please*)

Aero Chamber Urges Earlier Amortization

With a view to establishing a more equitable determining date for amortization, the Aeronautical Chamber of Commerce of America, Inc., has laid before the Senate Finance Committee the results of a survey showing that the aviation industry completed plant expansions and installations of new equipment costing a total of $52,445,255 between Sept. 8, 1939, the date the national emergency was declared to exist, and July 10, 1940, the date used by the House Ways and Means Committee for the beginning of amortization under the proposed new excess profits tax legislation.

The purpose of the survey was to acquaint the Senate Finance Committee with the hardships which would result from the use of the July 10, 1940, date for beginning amortization deductions. The Chamber pointed out that unless the earlier amortization date is used, the manufacturers will have on their hands a large investment in idle plants and facilities which will not be needed under normal conditions and which must be carried as costs in future curtailed production.

Of the $5,445,255 spent between Sept. 8, 1939, and July 10, 1940 in completion of new facilities, Colonel John H. Jouett, president of the Aeronautical Chamber of Commerce, said the survey indicated that only $11,388,917 worth of these facilities will be required by the industry at the close of the emergency, leaving an excess of $41,056,336 in new equipment. He emphasized that it is

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Business in Brief

***Written by the Guaranty Trust Co., New York, Exclusively for* AUTOMOTIVE INDUSTRIES**

The expansion of general business activity that characterized the second half of August continues. The New York *Times* seasonally adjusted index for the week ended Aug. 24, at 104.3 per cent of the estimated normal, registered a fortnightly advance of 2.2 points. The unadjusted index of *The Journal of Commerce* rose to 107.1 per cent of the 1927-29 average, as against 105.4 two weeks earlier and 93.0 a year ago.

Retail trade quickened last week; regional averages, according to Dun & Bradstreet estimates, were from seven to 13 per cent above corresponding 1939 levels, the greatest indicated excess since Easter. Department store sales during the preceding week were 12 per cent above the comparable total last year, according to the Federal Reserve compilation.

Production of electricity by the power and light industry declined moderately in the week ended Aug. 24; the gain over corresponding output last year was 9.2 per cent, as against 10.1 per cent for the week before.

The movement of railway freight during the same period reached a new peak for the year; the number of cars loaded, 761,002, was 11.3 per cent more than the comparable 1939 loadings. Freight movement by motor truck during July was 1.8 per cent below the June tonnage but 17.7 per cent above that of a year ago.

Bank debits to other than inter-bank accounts in leading cities during the week ended Aug. 28 were considerably below the total for the preceding week; for the 13-week period then ended the aggregate was one per cent less than the corresponding amount last year.

Crude oil production during the week ended Aug. 31 declined further to an average of 3,501,350 barrels daily and was 156,350 barrels less than the required output as computed by the Bureau of Mines.

Engineering construction contracts awarded during the week ended Aug. 29 dropped 55 per cent from the near-record figure for the preceding week, despite a gain in private work, according to *Engineering News-Record*. The cumulative 1940 total is four per cent above the corresponding amount last year.

Cotton-mill activity increased contra-seasonally in the week ended Aug. 24. The New York *Times* adjusted index rose to 135.7 from 132.6 for the week before, as compared with 124.0 a year ago.

Business failures during the week ended Aug. 29 totaled 229, the smallest weekly figure in six months, according to the Dun & Bradstreet report.

Professor Fisher's index of wholesale commodity prices advanced last week to 81.6 per cent of the 1926 average from 81.0, thus far the year's lowest level.

Excess reserves of the member banks of the Federal Reserve system rose $70,000,000 during the week ended Aug. 28 to an estimated total of $6,490,000,000. Business loans of the reporting members increased $8,000,000 and were $467,000,000, or about 12 per cent. greater than a year ago.

MEN . . . . . .

H. A. Myers has been appointed assistant branch manager of the Gar Wood factory branch, Long Island City, New York.

A. T. Court has resigned as economist with the Automobile Manufacturers Association to become chief statistician for the production division of the National Defense Advisory Commission. His office is in the Federal Reserve Building, Washington, D. C.

Ralph De Palma, former ace racing driver, has joined the staff of the National Aeronautics Council. The Council was recently organized, chiefly for the purpose of training young men and women for aviation careers, preparing them by mail for subsequent practical flying instruction at government or private flying schools; also preparing for the many jobs on the ground connected with aircraft and transport industries.

Milton P. Higgins, resident manager of the Norton electric furnace plant at Chippawa, Ontario, for the past two years, has been transferred to the Worcester headquarters as assistant manager of abrasive production and research. He is a director of Norton Co. and also of its Behr-Manning division.

Creation of the SAE Aeronautical Standards Board for National Defense and the appointment of **Theodore P. Wright** as its chairman has been announced by the Society of Automotive Engineers. The new board will undertake a cooperative program of development and coordination of aircraft standardization in connection with national defense. Mr. Wright, vice-president in charge of engineering for the Curtiss-Wright Corp., is on leave of absence from his company to serve as executive officer of the Airplane and Engine Division, Advisory Commission to the Council of National Defense.

A. W. Tacy has been named assistant sales promotion manager of Cadillac-LaSalle, succeeding J. W. Eberts, who resigned to take a Cadillac-LaSalle sales agency. Tacy joined Cadillac-La Salle in 1937.

L. W. Martz has been appointed director of technical publicity of the Micromatic Hone Corp. He was formerly advertising manager of the same company.

Harry Frier, assistant advertising manager of the DeSoto Division of Chrysler Corp., has resigned to become advertising manager for the Chicago & North Western Railroad.

Wilbur Shaw has been named manager of the aeronautics division of The Firestone Tire & Rubber Co.

Dr. Samuel L. Hoyt, of Battelle Memorial Institute, has been selected to prepare and deliver the annual Edward de Mille Campbell Memorial Lecture before the American Society for Metals on Oct. 23 in Cleveland.

George M. Class, formerly chief engineer of the Gisholt Machine Co., Madison, Wis., has been elevated to the post of vice-president in charge of engineering. **Frederick L. Chapman,** formerly assistant sales manager, has been appointed sales manager.

H. E. Ardahl, formerly chief metallurgist of John Deere Tractor Co.,

New Truck Registrations

	July 1940	June 1940	July 1939	SEVEN MONTHS 1940	SEVEN MONTHS 1939	Per Cent Change, 6 Months 1940 over 1939	Per Cent of Total Seven Months 1940	Per Cent of Total Seven Months 1939
Chevrolet	16,384	14,246	15,432	115,561	104,315	+ 10.8	33.79	35.53
Ford	14,447	11,647	12,514	95,721	77,973	+ 23.0	27.99	26.56
International	7,104	6,291	5,744	44,677	36,421	+ 22.7	13.06	12.41
Dodge	4,731	4,412	4,562	34,298	31,619	+ 8.5	10.03	10.77
G. M. C.	4,252	3,357	2,872	25,337	19,444	+ 30.0	7.41	6.62
Plymouth	999	902	946	6,470	5,874	+ 10.0	1.89	2.00
Mack	718	561	541	4,222	3,709	+ 13.9	1.23	1.26
White	476	574	358	3,995	2,562	+ 55.8	1.17	.87
Diamond T	642	533	436	3,773	2,867	+ 31.6	1.10	.98
Willys-Overland	248	188	133	1,471	962	+ 53.0	.43	.33
Divco	106	107	117	1,004	898	+ 11.6	.29	.31
Autocar	160	127	300	975	1,222	− 20.2	.28	.42
Federal	121	116	116	967	850	+ 13.9	.28	.29
Brockway	153	121	170	851	1,056	− 19.4	.25	.36
Studebaker	77	103	229	765	1,309	− 41.5	.22	.45
Hudson	64	67	43	507	317	+ 60.0	.15	.11
Bantam	26	24	53	284	328	− 13.4	.08	.11
Sterling	28	30	28	195	193	+ 1.0	.06	.07
F. W. D.	17	11	34	155	117	+ 32.5	.05	.04
Reo	78	20	31	132	771	− 82.6	.04	.26
Miscellaneous	82	67	88	671	766	− 12.5	.20	.25
Total	50,913	43,504	44,747	342,031	293,573	+ 16.5	100.00	100.00

Passenger Car and Truck Production *(U. S. and Canada)*

	July 1940	June 1940	July 1939	SEVEN MONTHS 1940	SEVEN MONTHS 1939	Per Cent Change
Passenger Cars—U. S. and Canada						
Domestic Market—U. S.	165,672	276,949	142,346	2,124,820	1,620,897	+31.0
Foreign Market—U. S.	3,097	9,091	8,392	71,379	111,992	−36.1
Canada	3,397	8,739	5,112	75,683	75,030	+ 0.9
Total	172,166	294,779	155,850	2,271,882	1,807,969	+25.7
Trucks—U. S. and Canada						
Domestic Market—U. S.	53,074	49,505	43,935	388,027	342,310	+13.4
Foreign Market—U. S.	9,860	9,091	14,686	76,005	96,149	−21.0
Canada	11,071	9,191	4,129	49,697	27,920	+78.1
Total	74,005	67,787	62,750	513,729	466,379	+10.0
Total—Domestic Market—U. S.	218,746	326,454	186,281	2,512,847	1,963,207	+28.0
Total—Foreign Market—U. S.	12,957	18,182	23,078	147,384	208,141	−29.3
Total—Canada	14,468	17,930	9,241	125,380	103,000	+21.8
Total—Cars and Trucks—U. S. and Canada	246,171	362,566	218,600	2,785,611	2,274,348	+22.5

Waterloo, Iowa, has been appointed assistant to the vice-president of Michiana Products Corp., Michigan City, Ind., producers of heat, corrosion and abrasion resistant alloy castings.

MEMA Index Down To 121% in July

The Motor and Equipment Manufacturers Association reports that original equipment shipments during July showed their usual decline, but all after market divisions showed gains. The MEMA grand index for all branches of the industry in July dropped to 121 per cent of the January 1925 base as compared with 140 per cent for June and 110 per cent for July 1939.

Shipments to vehicle manufacturers for original equipment in July decreased to 101 per cent of the base, which compares with 139 per cent registered in June and 94 per cent for July last year. Service parts shipments to wholesalers for July rose to 172 per cent of the base as compared to 165 per cent in June. In July 1939 the index stood at 154 per cent.

Accessories shipments to wholesalers in July increased, standing at 93 per cent of the base index, which compares with 86 per cent in June and 113 per cent in July 1939. Service equipment shipments to wholesalers in July advanced to 120 per cent of the base, which compares with 117 per cent in June and 97 per cent in July 1939.

W. S. Knudsen Relinquishes All Connections With GM

Alfred P. Sloan, Jr., chairman of the board of directors of General Motors Corp., has announced that because of his governmental duties as a member of the National Defense Advisory Commission, William S. Knudsen, on leave of absence since June 1, 1940, in the service of the Government, and at his request relieved from duty as an officer of the corporation, tendered his resignation as president, as a member of the board of directors and of the corporation's policy and administration committees, thereby completely severing his official relation with the corporation.

The board stated that in view of the approaching time when the corporation may be in a position to enter into contracts with the Government to supply products required under the defense program, it must of necessity accept Mr. Knudsen's resignation in order to remove any possibility of conflict of interests, owing to Mr. Knudsen's dual position.

The announcement also revealed that C. L. McCuen, vice-president, has been elected a member of the administration committee, and Harley J. Earl, director of the corporation's styling section, a vice-president of the corporation.

Census Bureau Clears 1939 Data on Defense Industries

Responding to a request by the National Defense Advisory Commission, the Bureau of the Census is giving the right-of-way to 1939 returns on industries which are of special importance to national defense and its first report covers rubber tires and inner tubes. The defense commission will use information in the Census reports in formulating policies in connection with the location and extent of plant expansion.

The rubber tire and inner tube industry production in 1939 was valued at $580,928,993, an increase of 0.9 per cent as compared with $575,860,262 reported in 1937. Wage earners totaled 54,115, a decrease of 14.5 per cent compared with 63,290 in 1937. Wages were $89,773,503, a drop of 7.2 per cent under the 1937 total of $96,706,731.

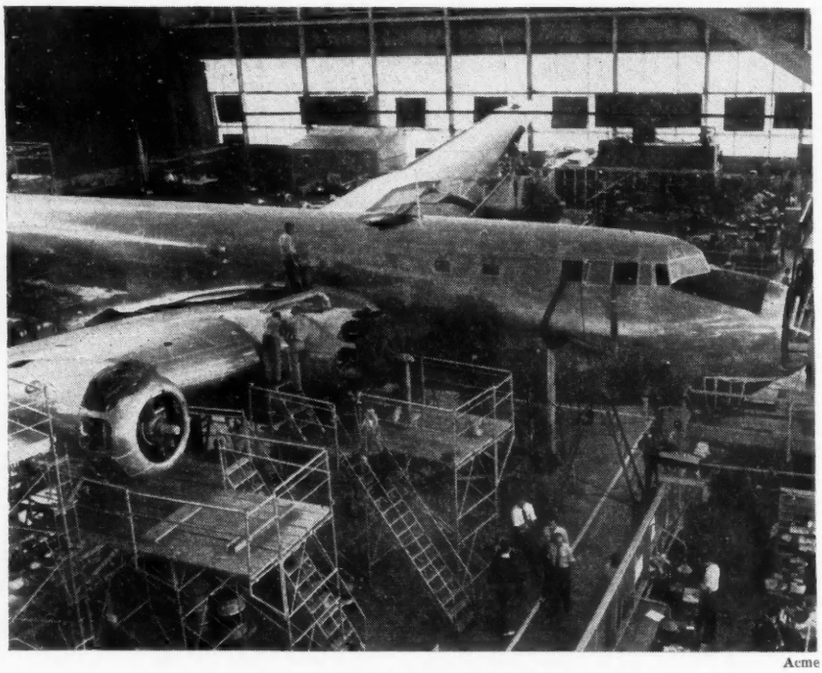
The bureau said these decreases in the number of wage earners and wages may be partially accounted for by the fact that the 1939 Census questionnaire for the first time called for personnel employed in distribution, construction, etc., separately from the manufacturing employes of the plants. The report added that it is not known how many of the wage earners were engaged in distribution and how many were engaged in manufacturing.

The 1939 reports by products, kind, quantity and value follows:

	1939	1937
Rubber Tires and Inner Tubes industry, all products, total value	$580,928,993	$575,860,262
Rubber tires and inner tubes, value	$497,636,438	$478,770,897
Other products not classified in this industry	$83,292,555	$97,089,365
Tires and inner tubes, total value	$497,636,438	$478,770,897
Pneumatic tires and casings:		
Motor-vehicle, except motorcycle and bicycle:		
Total number	58,372,275	54,113,445
Total value	$435,303,639	$412,765,798
Passenger-car:		
Number	49,166,077	45,668,599
Value	$269,241,421	$253,270,878
Truck and bus:		
Number	8,178,568	7,702,436
Value	$155,834,737	$156,459,385
Airplane:		
Number	30,405	32,710
Value	$544,823	$667,985
All other:		
Number	997,225	709,700
Value	$9,682,658	$2,367,550
Motorcycle and bicycle:		
Single-tube tires:		
Number	1,655,503	1,654,216
Value	$1,202,485	$1,390,700
Casings:		
Number	4,557,455	3,402,263
Value	$3,384,735	$3,191,864
Inner Tubes:		
Passenger-car, truck and bus:		
Number	51,016,763	57,372,908
Value	$52,510,944	$55,739,387
Airplane:		
Number	27,192	25,026
Value	$104,961	$101,912
Motorcycle and bicycle:		
Number	4,404,351	3,397,286
Value	$1,532,157	$1,186,697
All other:		
Number	645,737	167,906
Value	$1,343,332	$470,135
Solid and cushion tires, all types, value	$2,254,185	$3,924,404

Monthly Motor Vehicle Production *(U. S. and Canada)*

	PASSENGER CARS 1940	PASSENGER CARS 1939	TRUCKS 1940	TRUCKS 1939	TOTAL MOTOR VEHICLES 1940	TOTAL MOTOR VEHICLES 1939
January	375,476	292,869	74,016	64,093	449,492	356,962
February	350,535	253,914	71,690	63,606	422,225	317,520
March	364,947	312,392	75,285	77,107	440,232	389,499
April	375,626	286,200	76,807	68,066	452,433	354,266
May	338,353	249,455	74,139	63,793	412,492	313,248
June	294,779	257,289	67,787	66,964	362,566	324,253
July	172,166	155,850	74,005	62,750	246,171	218,600
7 Months	2,271,882	1,807,969	513,729	466,379	2,785,611	2,274,348
August	.....	62,475	.....	40,868	.....	103,343
September	.....	165,119	.....	27,560	.....	192,679
October	.....	259,610	.....	65,079	.....	324,689
November	.....	295,134	.....	73,407	.....	368,541
December	.....	384,858	.....	84,260	.....	469,118
Total	.....	2,975,165	.....	757,553	.....	3,732,718



Acme

Cruising Radius: 6000 Miles

A general view of the world's largest bomber now in the final stages of construction at the Douglas Aircraft plant at Santa Monica, Calif. The four-engine plane, with a 56,000-lb. load of bombs and crew of 10, has a cruising radius of over 6000 miles. Distance from wing tip to wing tip is 210 ft. Engines deliver 8000 hp.

Three-Phase Labor Supply Program Now In Operation

Sidney Hillman of Defense Commission Describes Plan Designed To Assure Adequate Man Power For U. S. Defense

In announcing a three-phase labor supply program which he says will assure adequate man power for the defense program, Sidney Hillman, in charge of the Labor Division of the National Defense Advisory Commission, pointed out the first step, already completed, was to inventory the number of unemployed, according to skills. Through the 1500 offices affiliated with the United States Employment Service, it was stated, 5,500,000 men have been registered. Available at all times to private employers, Mr. Hillman said, is a list of men in particular trades or skills in each locality. Similar inventories of their unemployed membership, it was stated, are being made by the larger trade unions.

As defense contracts are let, estimates are being made of the number of men necessary in each skill and when the men will be needed. From this, the labor division makes estimates of the potential demand for man power for any particular area.

The other two phases of the program cover cooperation with industry for training men in industrial plants and a vocational training program in the nation's schools.

Mr. Hillman said that at present the labor division is uncovering reserves which may be called on if labor shortages threaten. After skilled men now employed are taken up, the next reserve is composed of skilled men now in other occupations. As an example, he pointed out the many men doing semi-skilled work in auto assembly lines have had previous experience in more highly skilled occupations and will be offered "refresher" courses to bring back earlier skills.

The second phase of the program, providing for cooperation of industry in training new men in industrial plants will be under the supervision of a labor division staff. In various regions throughout the country, it was stated, experts in industrial relations and personnel work, with the volunteer assistants, will, on request, demonstrate the training of employes to management in local plants. Special training will be given employes showing capabilities of advancement. These employes will be selected by manufacturers. As expansion occurs, it was explained, these specially-trained employes will take over positions of greater responsibility, "thus eliminating possible serious shortages of key men."

"At the same time, untrained recruits are being trained under experienced employes," Mr. Hillman said. "There will be a constant inflow from the bottom and constant preparation of men to take over more responsible positions as fast as they are ready. For example, at Paterson, N. J., heads of vocational schools worked out a joint program for training in industry with the Wright Aeronautical Corp. The vocational school makes the selection and gives a preliminary four-week training course from which the trainees go directly to the company factory. They observe the simpler machine processes under an experienced operator who coaches the trainees until they are able to take over. Thus a continual flow from rudimentary knowledge, step by step through the machine process to the most skillful jobs, has been developed. People with more highly developed skills obtained through the public employment offices are fitted into the pattern at the level of their skill. When all industries are geared on this basis, it will be a relatively simple problem to expand production quickly."

The third phase of the program—vocational training in public schools—is under the supervision of the United States Office of Education. The reserve includes enrollees in NYA, CCC, and WPA. At present, it was said, more than 100,000 are now enrolled in the vocational schools, mostly taking "refresher" courses. Adults were said to be taking courses by which skills may be refreshed or brought up to date with advancing mechanization.

It was stated that men and women are being trained in other vitally important reserves. Under the NYA, approximately 68,000 are at work part time in 3636 NYA shops, where, for example, 3738 are receiving experience in automotive shop work, 1486 in airplane work and 7946 in metal and mechanical trades. In CCC, it was stated, 300,000 enrollees are learning defense trades. By September, it was said, 25,000 WPA had been enrolled in training courses in automobile and aviation training, radio and electrical service, sheet metal work and drafting. The United States Civil Service Commission, Mr. Hillman stated, is recruiting 100,000 civilian workers for the navy yards, arsenals and other defense establishments operated by the government.

PUBLICATIONS

Differential dual wheels for axle service of any type are the subject of a leaflet issued by the Differential Wheel Corp., Detroit.*

Catalog No. 18 covering its complete line of **eye protection devices** has been prepared by the Sellstrom Mfg. Co., Chicago.*

"Productivity, Wages and National Income" is the title of a booklet issued by the Brookings Institution, Washington, D. C. The booklet is a digest of a study financed under a grant by the Maurice and Laura Falk Foundation of Pittsburgh, Pa.*

"Looking Up With Aviation in 1940," a survey of the finances and revenues of aircraft manufacturers and air transportation

companies in the United States, has been published by the National Credit Office, Inc., New York, N. Y.*

National Piston Ring Co., Fruitport, Mich., has prepared a leaflet on **piston ring development** entitled "The Old Standard Is No Longer 'Good Enough' ".*

The RT-20 **oil control ring,** a new design offered by the Sealed Power Corp., Muskegon, Mich., is the subject of a folder recently issued.*

A new six-page folder describing "Truform," a non-shrinkable, oil hardening alloy **steel for use in tools and dies** where extreme accuracy is required, has been issued by the Jessop Steel Co., Washington, Pa.*

"The Great Reliance for National Defense" is the title of a booklet prepared by the Farrel-Birmingham Co., Inc., Ansonia, Conn. It is described by Farrel-Birmingham as a study "which weighs the position of possible combinations of hostile nations relative to our own, endeavoring to show the extent by which our mechanization compensates for what otherwise would be a substantial disadvantage with respect to man-power and working hours." Single copies are free.*

Behr-Manning, Troy, N. Y., has prepared a booklet entitled **"Sandpaper, Its How and Why."***

The American Nickeloid Co., Peru, Ill., has released a series of mailing pieces dealing with the economy of **pre-finished metals.***

Four new catalogs have been prepared by the **DeVilbiss Co., Toledo, Ohio.** The subjects are as follows: Air Compressors, Hose, Spray Painting and Finishing Systems, and Portable Spray Painting Equipment.*

*Obtainable through editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia. Please give date of issue in which literature was listed.

Globe

For Streamlined Maneuvers

A new type of U. S. Army staff car built by Dodge

Automotive Groups Active At Conference of Retailers

Headed by President Stanley H. Horner, Washington, a delegation from the National Automobile Dealers' Association, and President R. J. Murphy, of the Washington Automotive Trade Association, and Arthur Carley, of the American Automobile Association, participated in a retailer conference held in Washington on Aug. 29, with the Consumer Division of the National Defense Advisory Commission at which warnings against unjustifiable retail price advances were sounded.

The conference elected a Retailers' Advisory Committee, of which Fred Lazarus, Jr., vice-president of the department store firm of F. & R. Lazarus & Co., Columbus, Ohio, was made chairman. The committee will meet in Washington on Sept. 16 and 17 and report on study to effectuate a resolution adopted unanimously "to prevent so far as possible any unjustifiable rise in retail prices by urging upon the general retail trade vigorous opposition to all price increases which appear to be unwarranted and which cause difficulty to the government and the consuming public." The resolution was offered by Oswald Knauth, chairman of the National Retail Dry Goods Association, who also was chosen as a member of the Retailers' Advisory Committee. The conference was attended by 140 retailers representing all branches of the retail trade.

The conference was called by Miss Harriet Elliott, consumer adviser of the defense commission. In opening the meeting she spoke of the "self-generating character of a price spiral" and urged cooperation "by an adequate exchange of informaton and by a self-imposed determination to abstain from speculative profiteering."

"Specifically, I have in mind at the moment a type of advertising which is being used by some merchants who are urging consumers to 'buy now before the prices go up'," said Miss Elliott. "That is a type of scare advertising which contributes very definitely to the development of just that kind of price spiralling that we ought to be resisting with every means at our command."

More bluntly, Ben Lewis, chief economist in the office of consumer adviser of the defense commission, said that the commission will act "tough" to project the consumer. He said he knew of no major sacrifice the consumer should make as a result of the defense drive.

Mr. Lazarus, speaking for the retail trade, told the delegates that if they fail to discipline themselves, "we can look forward to government regulation such as we have never known before."

Seven Months' Exports and Imports

	JULY 1940		JULY 1939		SEVEN MONTHS ENDED JULY 1940		SEVEN MONTHS ENDED JULY 1939	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Automobiles, parts and accessories	.....	$ 13,964,258	.....	$ 18,519,924	.....	$ 149,097,291	.....	$ 162,776,558
PASSENGER CARS								
Passenger cars and chassis	3,584	2,246,549	8,260	4,787,662	60,903	37,863,456	97,996	59,973,461
Low price range $850 inclusive	3,200	1,834,864	7,650	4,102,434	53,938	30,568,318	87,567	48,927,941
Medium price range over $850 to $1200	330	309,978	504	489,779	6,020	5,724,693	8,960	8,558,604
$1200 to $2000	35	50,812	66	94,727	818	1,188,925	1,195	1,770,456
Over $2000	19	50,895	40	100,722	127	381,520	274	716,460
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total)	7,511	4,521,956	10,772	6,328,508	66,055	52,255,164	75,357	46,053,459
Under one ton	1,090	472,523	1,671	669,721	8,864	4,006,327	11,439	4,790,879
One and up to 1½ tons	5,565	2,726,149	7,776	4,040,687	43,710	23,550,128	52,603	28,471,102
Over 1½ tons to 2½ tons	599	533,760	1,018	1,075,787	9,141	11,671,074	8,154	7,205,051
Over 2½ tons	242	768,633	254	503,700	4,201	12,828,019	2,650	5,156,218
Bus chassis	15	20,891	53	38,613	139	199,616	511	430,209
PARTS, ETC.								
Parts except engines and tires	.....	.....	.....	.....	.....	.....	.....	.....
Automobile unit assemblies	.....	3,489,621	.....	2,784,100	.....	26,504,193	.....	24,202,931
Automobile parts for replacement (n.e.s.)	.....	2,709,757	.....	3,217,922	.....	23,294,827	.....	23,005,563
Other automobile accessories (n.e.s.)	.....	337,026	.....	311,647	.....	2,682,125	.....	2,230,727
Automobile service appliances	.....	362,744	.....	442,410	.....	2,448,266	.....	3,621,713
Airplanes, seaplanes and other aircraft (Powered)	335	16,562,599	122	5,605,220	1,797	108,439,629	855	36,217,561
Parts of airplanes, except engines and tires (n.e.s.)	.....	1,064,669	.....	9,039,122	.....	12,312,141	.....	58,049,775
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and semi-Diesel	88	183,375	35	74,626	580	1,902,631	275	1,047,018
Other stationary and portable	.....	.....	.....	.....	.....	.....	.....	.....
Not over 10 hp.	662	42,689	956	57,460	8,880	516,098	7,539	443,901
Over 10 hp.	253	331,606	250	94,997	1,453	2,424,762	1,086	621,429
Engines for:								
Motor trucks and buses	1,624	168,475	2,314	292,314	13,070	1,463,063	16,251	1,978,441
Passenger cars	865	85,659	3,633	191,549	12,034	1,080,843	18,106	1,567,905
Aircraft	437	3,829,135	172	1,191,765	2,445	21,533,497	999	6,966,936
Accessories and parts (carburetors)	.....	371,263	.....	231,324	.....	2,720,211	.....	1,616,679
IMPORTS								
Automobiles (dutiable)	72	83,683	66	55,034	374	403,577	322	238,356

UAW-CIO Fights Dismissal Of 20 Ford Patternmakers

Union Files Signed Affidavits of Employes With NLRB Charging Violation of Wagner Act

Formal charges over the dismissal of 20 patternmakers by the Ford Motor Co. have been filed with the Detroit office of the NLRB and forwarded to Washington. The charges were filed by Roy J. Thomas, president of the UAW-CIO, who charges that the men were dismissed Aug. 20 "because of their union membership and activities" in violation of the Wagner Act.

The UAW-CIO sent a telegram to Edsel Ford, president of the Ford Motor Co., on Aug. 22 requesting a conference between the management and the union over the alleged discharge of 74 patternmakers. The union charged that 37 of the men had recently joined the UAW-CIO.

In denying a conference, Harry H. Bennett said on behalf of the Ford Motor Co. that 51 men had been laid off temporarily in the department.

Twenty employes, whose service at the Ford Motor Co. ranged from three to 23 years, signed affidavits of their dismissal with the union and these were filed with the NLRB. They also said that petitions for a wage raise has been denied.

Organization of the Ford Motor Co., only large automobile manufacturer not under contract with the UAW-CIO, was listed as one of the union's prime objectives for 1941 at the recent convention in St. Louis. Past efforts to organize the Ford Rouge plant have proved unproductive. It even was reported that the union was considering asking for a Labor Board election in the Rouge plant.

Difficulties on the assembly line in the Fisher Body Pontiac Division retarded production for more than a week, beginning Aug. 30, in that plant and that of the neighboring Pontiac Motor Division of General Motors, which depends upon the Fisher plant for bodies. More than 6000 employes were made recurrently idle at the two plants for more than a week, with shifts working less than half of their scheduled eight hours.

E. R. Leeder, Fisher plant manager, said in a statement that it was necessary to stop the body assembly lines because of an accumulation of an excessive number of bodies requiring repairs and reworking of operations.

Walter P. Reuther, manager of the GM Division of the UAW-CIO, denied that there was any slowdown and blamed the trouble on the usual experience in a body plant at the start of a new model season. He said a number of timing standards were in dispute but asserted this had nothing to do with the assembly line trouble.

Both sides were proceeding cautiously in the controversy and several conferences were held between GM officials, headed by Floyd Tanner, head of the GM labor relations department, and union officers, led by Jack Macauley, of Pontiac, regional UAW-CIO director.

The UAW-CIO won an NLRB election at the Detroit plant of the American Brakeblok Division, 142 to 38.

Indicating that Detroit has a huge reservoir of labor to call upon with the expansion of the national defense program, a report of the Michigan Unemployment Compensation Commission Aug. 31 revealed that there were 227,491 workers on the commission files seeking employment. Only shortages may be in certain skilled crafts.

Sterling Changes Name and Address

The Sterling Products Co. of Detroit and Los Angeles is now the Sterling Tool Products Co. of Chicago. C. B. Johnson, formerly sales manager of Sterling Products, has been made vice-president and general manager of the new corporation.

New Quartermaster Motor Supply Depots Established

To expedite the distribution of motor transport parts to army units throughout the country the War Department has established seven new quartermaster motor supply depots.

The department announced that the depots will be located at Schenectady, N. Y.; Baltimore, Md.; Atlanta, Ga.; Fort Wayne, Mich.; Fort Leavenworth, Kan.; Normoyle Quartermaster Depot, Tex., and San Francisco.

Fort Wayne will be the key depot and will replenish the other depots with parts. The depots will request parts by radio, telegraph, or long distance telephone, and delivery will be made from the Fort Wayne Depot by express if necessary. Fort Wayne was

New Passenger Car Registrations

	JULY 1940	JUNE 1940	JULY 1939	SEVEN MONTHS 1940	SEVEN MONTHS 1939	Per Cent Change, 7 Months, 1940 over 1939	Per Cent of Total Seven Months 1940	Per Cent of Total Seven Months 1939	NINE MONTHS MODEL YEAR 1940	NINE MONTHS MODEL YEAR 1939	NINE MONTHS MODEL YEAR Per Cent Change
Chevrolet	77,374	78,951	52,096	534,949	383,991	+ 39.3	25.11	23.44	659,288	487,975	+35.0
Ford	54,791	50,492	47,043	350,823	299,825	+ 17.0	16.47	18. 0	442,113	366,411	+ 21.0
Plymouth	41,682	45,635	30,826	282,022	229,453	+ 23.0	13.24	14.00	310,669	296,745	+ 4.4
Buick	25,304	24,119	15,576	169,731	124,131	+ 36.8	7.97	7.58	221,179	161,962	+ 36.5
Pontiac	21,033	22,341	11,902	140,597	94,181	+ 49.2	6.60	5.75	176,846	119,921	+ 47.5
Dodge	19,285	19,413	17,796	132,312	126,515	+ 4.7	6.21	7.72	145,658	154,584	— 5.7
Oldsmobile	17,199	18,223	10,649	120,673	84,798	+ 42.2	5.67	5.18	154,250	110,201	+ 40.2
Chrysler	9,262	9,477	5,895	63,430	43,527	+ 45.7	2.98	2.66	69,308	54,324	+ 27.6
Studebaker	9,375	10,172	8,003	62,256	43,325	+ 43.8	2.92	2.64	79,419	52,793	+ 50.3
Mercury	8,045	7,405	6,394	52,502	38,702	+ 35.8	2.46	2.36	66,631	45,537	+ 46.1
Hudson	5,544	7,361	4,250	46,895	30,372	+ 54.5	2.20	1.85	63,237	39,779	+ 59.0
De Soto	7,215	6,910	5,203	45,021	33,661	+ 33.5	2.11	2.05	49,954	41,746	+ 19.5
Packard	6,439	6,352	3,120	43,887	27,555	+ 59.4	2.06	1.68	58,712	36,622	+ 60.1
Nash	4,937	4,719	4,180	33,988	33,014	+ 3.0	1.60	2.01	43,609	38,618	+ 13.0
La Salle	1,877	1,945	1,634	13,397	13,039	+ 3.0	.63	.80	18,599	17,693	+ 5.0
Willys	2,069	1,827	943	13,276	6,966	+ 90.1	.62	.43	17,200	8,888	+ 93.5
Lincoln	2,100	1,522	1,697	13,003	12,066	+ 7.9	.61	.74	17,029	15,428	+ 10.0
Cadillac	941	988	920	7,422	7,861	— 5.5	.35	.48	10,168	10,517	— 3.5
Graham	258	218	400	882	2,841	— 69.0	.04	.17	990	3,555	— 72.1
Bantam	72	57		584			.03		735		
Crosley	13	16		257			.01		364		
Hupmobile	7	12	71	40	741	— 94.6		.05	60	842	— 93.0
Fiat				11					20		
Miscellaneous	424	460	710	2,102	1,796	+ 17.0	.11	.11	2,137	2,095	+ 2.0
Total	315,246	318,615	229,308	2,130,060	1,638,410	+ 30.0	100.00	100.00	2,608,175	2,066,236	+ 26.1
Chrysler Corp.	77,444	81,435	59,720	522,785	433,156	+ 20.7	24.54	26.44	575,589	547,399	+ 5.0
Ford Motor Co.	64,936	59,419	55,134	416,328	350,593	+ 19.0	19.55	21.40	525,773	427,376	+ 23.0
General Motors Corp.	1,437,728	146,567	92,777	986,769	708,051	+ 39.2	46.33	43.21	1,240,330	908,269	+ 36.8
All Others	29,138	31,194	21,677	204,178	146,610	+ 39.1	9.58	8.95	266,483	183,192	+ 45.4

New Passenger Car Registrations and Estimated Dollar Volume of Retail Price Classes*

PRICE CLASS	NEW REGISTRATIONS								ESTIMATED DOLLAR VOLUME							
	JULY				SEVEN MONTHS				JULY				SEVEN MONTHS			
	Units		Per Cent of Total		Units		Per Cent of Total		Dollar Volume		Per Cent of Total		Dollar Volume		Per Cent of Total	
	1940	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940	1939
Chevrolet, Ford and Plymouth	173,847	129,965	55.22	56.69	1,167,794	913,269	54.88	55.76	$132,900,000	$95,000,000	48.91	49.48	$892,800,000	$668,600,000	48.57	48.26
Others under $1,000	98,235	81,393	31.20	35.50	676,734	579,373	31.80	35.37	88,900,000	74,000,000	32.72	38.54	612,200,000	531,300,000	33.30	38.35
$1,001 to $1,500	40,849	14,609	12.98	6.37	268,768	120,815	12.64	7.38	46,200,000	17,000,000	17.00	8.85	304,000,000	140,700,000	16.54	10.15
$1,501 to $2,000	1,198	2,045	.38	.89	9,174	16,077	.43	.98	2,100,000	3,000,000	.77	1.56	15,900,000	24,700,000	.86	1.78
$2,001 to $3,000	690	1,194	.22	.52	5,408	7,792	.25	.48	1,600,000	2,700,000	.59	1.41	13,100,000	17,800,000	.71	1.28
$3,001 and Over	3	65	.....	.03	69	543	.....	.03	20,000	300,000	.01	.16	330,000	2,500,000	.02	.18
Total	314,822	229,271	100.00	100.00	2,127,947	1,637,869	100.00	100.00	$271,720,000	$192,000,000	100.00	100.00	$1,838,330,000	$1,385,600,000	100.00	100.00
Miscellaneous	424	37	.....	.....	2,113	541	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	315,246	229,308	.....	.....	2,130,060	1,638,410	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new registrations of each model. The total dollar volumes are then consolidated by price classes.

until recently the station of the 2nd Infantry (less two batallions). Corps areas served and the locations of the new Quartermaster Motor Supply Depots serving them are as follows: First and Second — Schenectady; Third—Baltimore; Fourth — Atlanta; Fifth and Sixth—Fort Wayne; Seventh—Fort Leavenworth; Eighth—Normoyle Quartermaster Depot; Ninth — San Francisco.

The first and second corps areas include the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware and New York.

The third corps area includes the States of Pennsylvania, Maryland, Virginia and the District of Columbia.

The fourth corps area includes the States of North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi and Louisiana.

The fifth and sixth corps areas include the States of Ohio, West Virginia, Indiana, Kentucky, Illinois, Michigan and Wisconsin.

The seventh corps area includes the States of Missouri, Kansas, Arkansas, Iowa, Nebraska, Minnesota, North Dakota and South Dakota.

The eighth corps area includes the States of Texas, Oklahoma, Colorado, New Mexico and part of Arizona.

The ninth corps area includes the States of Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada, California and part of Arizona.

New Caterpillar 60 Hp. Engine

Caterpillar Tractor Co. has announced a four-cylinder, 60-hp. automotive engine, called the Model D312. It is a four stroke, valve-in-head, water cooled model with a bore of 4¼ in. and a stroke of 5½ in. Maximum horsepower is developed at 1800 r.p.m., and maximum torque of 193 lb-ft. at 1200 r.p.m. Piston displacement is 312 cu. in.

Bantam Bearings Adds to Buildings

New office and factory additions of the Bantam Bearings Corp., South Bend, Ind., will be completed soon, adding about one-third more floor space to present area to accommodate new equipment and facilities. Space now occupied by offices will become new physical and metallurgical laboratories.

New $1,000,000 Lincoln-Zephyr Plant Completed

The work of installing equipment in the Ford Motor Co.'s new $1,000,000 Lincoln-Zephyr body plant at Detroit is now in its final stages. The new department has a normal productive capacity of 150 bodies each eight hours. Approximately 25 hours in elapsed time is required to build each body, from the time the individual pieces start through the plant on the conveyor lines until the completed car rolls off the final assembly line.

It is said that the 1941 bodies have 4300 spot welds, 232 arc welds and 112 in. of gas welds. New equipment to make these welds includes 335 spot welding guns, 52 stationary spot welders and eight butt welders.

Borg-Warner Corp. Declares Dividend

Borg-Warner Corp., Chicago, has declared a dividend of 25 cents per share on its common stock, payable Oct. 1, 1940, to stockholders of record at the close of Sept. 17, 1940.

Harold M. Spears

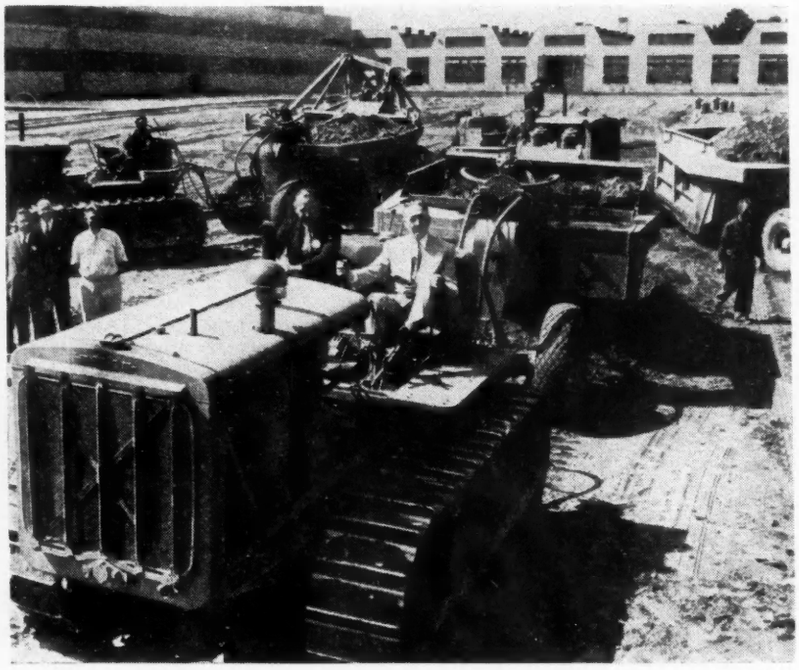
Harold M. Spears, general manager of the Chevrolet transmission plant at Saginaw, died suddenly at his home Sept. 5 of a heart attack. He joined the Chevrolet organization in 1917 as a metallurgist and became general manager of the Saginaw plant in 1937. He was 45 years old.

Edwin S. Lunt

Edwin S. Lunt, manager of the Flint, Mich., Buick retail branch, died Sept. 6 of a heart attack. Mr. Lunt was 68 years old. He began work for the Buick Motor Co. in 1907 and had been manager of the Flint branch since 1925.

Nos. 1 and 2

Edsel Ford (center) presented a $5,000 college scholarship to Gene M. Kennard (right) and a $2,000 college scholarship to Jimmie Hymer (left) when they won first and second place in the recent first annual boys' automobile driving meet held at the New York World's Fair under the sponsorship of the Ford Good Drivers League.



Acme

Another Huge Plant

Glenn L. Martin (right) at the controls of a Diesel tractor during ceremonies marking the breaking of ground for the first of a series of expansions at the Martin aircraft plant in Baltimore, Md. Next to Mr. Martin on the tractor is Captain DeWitt C. Ramsey, chief of plans, Bureau of Aeronautics, U. S. Navy. When completed, the factory buildings will have a total of nearly 3,000,000 sq. ft. of floor space.

Cars of Yesterday

Visitors to the forty-first National Automobile Show, which will be held Oct. 12 to Oct. 20 at Grand Central Palace in New York City, will see on the fourth floor a display of some of the first cars built; also a number of famous cars which have made history as winners of Vanderbilt Cup races, Glidden Tours, and other contests, or that have belonged to or carried noted people.

CALENDAR

Conventions and Meetings

National Industrial Advertisers Association, Annual Meeting, Detroit, Sept. 18-20
SAE National Tractor Meeting, Milwaukee .....Sept. 24-25
SAE Annual Dinner, New York.....Oct. 14
American Society for Metals, Annual Meeting, Cleveland, Ohio.....Oct. 21-25
American Welding Society, Annual Meeting, Cleveland .....Oct. 20-25
SAE Nat'l Aircraft Production Meeting, Los Angeles .....Oct. 31-Nov. 2
Aeronautical Chamber of Commerce of America, Inc., Annual Meeting, New York .....Dec. 5
National Association of Manufacturers, Annual Meeting, New York....Dec. 9-13
SAE Annual Meeting, Detroit, Jan. 6-10, 1941
National Automobile Dealers Association, Convention, Pittsburgh, Pa. Jan. 20-23, 1941

Shows at Home and Abroad

Detroit Automobile Show .....Oct. 12-19
National Automobile Show, Grand Central Palace, New York.....Oct. 12-20
Pittsburgh Automobile Show.....Oct. 19-26
National Metal Congress & Exposition, Cleveland, O. .....Oct. 21-25
Chicago Automobile Show....Oct. 26-Nov. 3
Automotive Service Industries Show, Chicago .....Dec. 9-14
Machine & Tool Progress Exhibition, Detroit .....Mar. 24-29, 1941

Ourselves & Government

A Check List of Federal Action Corrected to Sept. 10

FEDERAL TRADE COMMISSION

G-M EXCLUSIVE DEALER CASE—No date set as yet for arguments.

FOB PRICE CASE—No date set for resuming testimony in G-M and Ford proceedings.

TRADE PRACTICE RULES—Commission close-mouthed about rules for automobile retailers, not even admitting that rules will be promulgated. Prevailing view, however, is that commission will issue them at some undetermined date, despite opposition in trade to commission policing manufacturer-dealer relations. Some in trade, however, express belief that rules will be shelved by commission.

Cornell Offers Scholarships To Apprentices In Industry

A program of cooperation with American industry to train promising young employes as engineers has been announced by Dean S. C. Hollister of the College of Engineering, Cornell University. The plan will use part of the income from the $2,000,000 John McMullen Scholarship Fund to create John McMullen Industrial Scholarships for apprentices in industry selected by officers of the companies as men whose value would be increased by a college education in engineering.

Applications for the four scholarships to be awarded in September are now being received by the college.

NIAA Conference Will Focus on U. S. Defense

A program mobilizing the resources of industrial advertising and marketing, and directing its energies nationally toward achievement of America's defense objectives, has been outlined for the eighteenth annual conference of the National Industrial Advertisers Association, Sept. 18-20, at Hotel Stat-

Estimated Dealer Stocks of New Passenger Cars

1939	July	August	September	October	November	December
Production—U. S. Domestic Market †	142,346	56,245	155,430	239,150	272,747	357,712
Retail Sales—U. S. ‡	229,873	166,172	139,222	236,584	257,398	274,233
Change in Inventory	−87,527	−109,927	+16,208	+2,566	+15,349	+83,479
Inventory, First of Month	295,708	208,181	98,254	114,462	117,028	132,377
1940	**January**	**February**	**March**	**April**	**May**	**June**
Production—U. S. Domestic Market †	348,755	324,555	341,634	351,814	315,441	276,949
Retail Sales—U. S. ‡	239,509	236,857	338,153	353,423	330,521	350,871
Change in Inventory	+109,246	+87,698	+3,481	−1,609	−15,080	−73,922
Inventory, First of Month	215,856	325,102	412,800	416,281	414,672	398,592
1940 (continued)	**July**	**August**	**September**	**October**	**November**	**December**
Production—U. S. Domestic Market †	165,672	.....	.....	.....	.....	.....
Retail Sales—U. S. ‡	298,618	.....	.....	.....	.....	.....
Change in Inventory	−132,946	.....	.....	.....	.....	.....
Inventory, First of Month	324,670	191,724	.....	.....	.....	.....

†—U. S. Census Bureau. ‡—Automobile Manufacturers Association.

ler in Detroit. Two general sessions and a series of clinic meetings will be staged during the three days.

"Make America Strong!" is the theme around which the conference has been planned. Methods of speeding the defense program will be given first consideration—and at the same time the conference will anticipate the inevitable readjustments in industry when defense demands subside.

By-Product Toluene Being Obtained From Petroleum

Showing that present commercial needs for paints, lacquers and other materials can be met by recovery from by-product coke ovens, E. R. Stettinius, Jr., in charge of the Industrial Materials Division of the National Defense Advisory Commission, has announced that potential supplies of toluene used in the highly important explosive TNT are adequate for all anticipated United States requirements. Mr. Stettinius' announcement was made as he released a study just completed in conjunction with the Army and Navy.

Experimental production of toluene from petroleum, it was said, indicates that this is an entirely practical source of supply. It was stated that large volumes can be made available in a relatively short time by the installation of additional recovery equipment. Plans are being made to provide stock supplies of toluene to prevent a temporary shortage.

"Two methods of getting by-product toluene from petroleum can be used," the report said. "The more important is the recovery of toluene in the production of high-octane gasoline used in aircraft. It is estimated that supplies can be made available by this method at costs comparable to those prevailing at coke-ovens. The second and more costly method, which could be used if emergency conditions required it, involves the 'cracking' of other petroleum products. Experimental production of toluene from petroleum has indicated that this is an entirely practical source of supply and that large volumes could be made available in a relatively short time by the installation of additional recovery equipment."

U. S. Rubber Imports Average $151,000,000

Prepared by P. W. Barker of the Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce, a new pamphlet entitled "Rubber—History, Production and Manufacture," points out that during the past five years the average value of our rubber imports has been in excess of $151,000,000 annually.

Approximately 150,000 persons are employed by about 500 American plants engaged in the manufacture of its finished products—producing goods with a retail value of more than $1,000,000,000 annually.

The handbook covers all phases of the industry, including sources of supply, ports of entry, and a complete history—from planting to the manufacture of finished products. Synthetic rubber, rapidly becoming more important, is adequately dealt with, as is the reclamation of rubber from old tires. World statistics are shown from 1860 to the present, as are typical formulas for manufactured rubber articles. The bureau previously issued two general circulars on the subject.

The pamphlet may be obtained at 10c. per copy from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from the Washington Office of the Bureau of Foreign and Domestic Commerce or any of its district offices, located in key cities throughout the United States.

Crude Rubber Consumption In July Increased 1.1%

According to statistics released by the Rubber Manufacturers Association, Inc., it is estimated that rubber manufacturers in the U.S.A. consumed 47,011 long tons of crude rubber during the month of July. This represents an increase of 1.1 per cent over the June consumption of 46,506 long tons, and is 4.5 per cent above July, 1939, when 44,975 (revised) long tons were consumed.

Gross imports for July as reported by the Department of Commerce were 69,474 long tons, representing an increase of 28.9 per cent over the June figure of 53,889 long tons, and were 85.9 per cent over the 37,372 long tons imported in July, 1939.

40 YEARS AGO

"Lucius E. Whiton is the patentee of a rubber tire with embedded metallic segments and fastening devices for connecting these segments with the felloes or spokes. The patent specification describes the method of manufacture of these tires as follows: The sections are supported in the mold by means of screws of the same size and number of threads as those to be afterward used for fastening the tires to the wheel, these screws projecting from the inner side of the mold into the threaded holes in the strips, whereby the strips are held in proper position to leave them embedded at or near the center of the tire. The rubber is then molded in the ordinary manner, and surrounds the strips, and the screws by which these strips are held. After the rubber is hardened, the screws used to hold the steel strips in the mold are turned out. The tire with holes for the screws all in proper place and with its embedded strips may then be stretched over the felloe."

From *The Horseless Age*, September, 1900.

CENSORED

An exclusive feature prepared by the London correspondent of AUTOMOTIVE INDUSTRIES, M. W. Bourdon.

If and when a would-be buyer can obtain a permit from the Ministry of Transport to buy a new car the transaction will be subject to the new Purchase Tax of 33 per cent on the trade price (approximately 25 per cent on the retail price). The tax will apply also to motor accessories, but not to used cars or to replacements.

* * *

An urgent appeal by the Minister of Supply was mailed recently to over 20,000 firms connected with various branches of engineering asking that, irrespective of age and type, every serviceable machine tool not in regular use should be offered to him for immediate purchase for war production. It is stated that the response was very satisfactory. Another appeal by the same Minister was that owners of old cars who could spare them for scrap should write to the Iron and Steel Control Board. Within a week 17,000 had been notified as available.

* * *

Probably the last official monthly returns until after the war of new car sales in Britain have been issued. They cover July up to the 20th, the date on which a ban on the sale of new cars was imposed. Surprisingly, the total is more than double that of June, viz., 3874 against 1891; this is possibly due to July 1 being the beginning of a new three-monthly licensing period. Last year the July total was 23,967. Truck sales numbered 1524 against 5612 in July, 1939, and buses 256 against 612.

* * *

Automotive Products Co. (a British firm with American associations, manufacturing Lockheed brakes, Borg and Beck clutches, Thompson steering joints and hydraulic controls for airplanes among other specialties) has equipped all its plants for "Music While You Work" broadcasts from radio reception and gramaphone records. It has been found that the music stimulates employes and has beneficial effect upon output.

* * *

The displacement of tramcars by buses of late years has made possible the use of 40,000 tons of road rails as scrap for the production of munitions. Already 10,000 tons have been taken up for this purpose and the remaining 30,000 tons have been scheduled for removal.

Agreements Reached on Army and Navy Plane Requirements

Arrangements Based on Policy Worked Out By National Defense Advisory Commission; Formal Contracts Follow

Proceeding under a policy worked out by the National Defense Advisory Commission, the War and Navy Departments have entered into agreements with aircraft manufacturers for huge joint requirements for the fiscal years 1941 and 1942. The agreements will be superseded by formal contracts.

Involving the largest number so far provided for, the War Department has made an agreement for the production of 20,000 airplane engines by the Wright Aeronautical Corp. The agreement also covers 14,000 propellers to be manufactured by the Curtiss-Wright Corp. The Navy Department has made an agreement with the United Aircraft Corp. for the production of about 17,000 Pratt & Whitney engines at a cost of approximately $160,000,000.

The agreements require that the manufacturers provide at their expense the buildings required for the expansion program.

The Navy agreements call for machine tools which will be provided for with government funds under a separate contract. The Navy agreement involves $47,000,000 worth of machine tools. The quantity to be purchased under the Army agreement was not announced. Title to the tools will vest in the government.

Engines and other requirements delivered to the Army will be paid for by transfer of Army funds to the Navy. In like manner the Army will, in turn, negotiate Navy requirements with manufacturers under its cognizance.

Recent Army contracts include the following: Lockheed Aircraft Corp., Burbank, Calif., 140 interceptor pursuit planes, $30,278,782; Boeing Aircraft Co., Seattle Wash., 277 heavy bombers, $70,449,955; Grumman Aircraft Engineering Corp., 144 utility planes; Edo Aircraft Corp., 1362 float-type landing gears and 150 additional Curtiss training planes.

Chairman Vinson of the House Committee on Naval Affairs has submitted to the House a report from the Navy Department showing that the department has made contracts for 1686 planes since June 1, 1940, as follows:

Beech Aircraft Corp., five utility transport; Naval Aircraft Factory, 500 primary trainers; North American Aviation, 25 advanced trainers; Stearman Aircraft Division, Boeing Airplane Co., 600 primary trainers; Spartan Aircraft Co., 201 primary trainers; Ryan Aeronautical Corp., 100 primary trainers; Grumman Aircraft Engineering Corp., 243 fighting planes; Grumman Aircraft Engineering Corp., 10 utility transport; Boeing Airplane Co., one patrol-bomber (experiment); and Lockheed Aircraft Corp., one transport.

The $5,256,000,000 second special defense appropriation bill provides for 7690 combat and 10,957 second-line planes for the Army. Even before the appropriation or amortization legislation was passed, plane manufacturers agreed to proceed with the construction of 1940 first-line fighting and 2307 secondary planes. The "proceed" agreements call for 428 heavy four-engined bombers; 139 heavy two-engined bombers; 78 one-engine dive bombers; 410 two-engine pursuit planes and 885 one-engine pursuit planes. The 5750 combat planes to be built subsequently under the supplemental appropriation act consist of 492 four-engine bombers; 1654 two-engine heavy bombers; 999 two-engine light bombers; 197 two-engine pursuit planes and 2408 one-engine pursuit planes.

Demand for Shipments of Automobile Steel Mounts

Truck Manufacturers Now in the Market for Steel to Be Used in Vehicles for Army Quartermaster's Corps

Motor truck manufacturers are in the market for part of the steel needed in the production of vehicles under Government contracts recently awarded for the Quartermaster's Corps of the Army. Specifications for these, it is the steel trade's understanding, entail no deviation from the standard grades of material used in the manufacture of motor trucks. A speed-up in the demand for immediate or nearby shipments of all descriptions of steel, used in automotive manufacture is noted, but no out-of-the-ordinary tonnages are being called for. Every so often, the covering of his current needs by this or that automobile manufacturer is singled out for publicity, but on analysis it is found that the tonnage involved represents nothing more than routine requirements in keeping with the assemblies scheduled for that term. More important is the relatively wider distribution of automotive orders over both the larger and smaller rolling and finishing mills, some of the latter having booked a considerable volume of business in recent weeks. Up to the time, when a few weeks ago automobile manufacturers released good-sized orders for body and fender stock, the smaller steel producers did a great deal of complaining that they did not fare as well as their larger competitors, but much of this shortcoming appears now to have been remedied.

Demand from parts makers for hot rolled strip steel has quickened. Representative commitments for bolts and nuts are reported. Automotive foundries have covered the major part of their fourth quarter pig iron needs. Pig iron sellers, in contrast with their former custom of naming prices for the ensuing quarter at about the same time as steel producers, no longer issue any binding quotations, their prices being for immediate acceptance. In spite of this, little change in the pig iron price situation is looked for over the remainder of the year. Although Labor Day is not officially recognized as a holiday in the steel industry, that distinction being reserved for Fourth of July and Christmas, some of the mills shut down, in consequence of which operations in that week, according to the American Iron & Steel Institute, were at the rate of 82.5 per cent of ingot capacity, compared with 91.3 per cent in the preceding week.

Tin output in the Dutch East Indies and some of the other producing countries has been stepped up to permit of double the export rate of a year ago, and the transport of the metal to our Pacific ports is suffering little interference. As a result, the market has a decidedly easier tone, with spot Straits quoted at 50½ cents a pound.—W. C. H.

Walter C. Marmon

Walter C. Marmon, chairman of the board of Marmon-Herrington Co., died Aug. 29. He was 68 years old. He held important positions in the old Nordyke & Marmon Co., when that predecessor of the present company manufactured the Marmon automobile. When the Marmon-Herrington Co. was organized, in 1931, he became chairman of the board.

Packard Given Canadian Order

Packard Motor Car Co. has received a $2,500,000 order for marine engines from the Canadian Government. Packard at present is completing an order for 81 marine engines for the United States Government at the rate of one engine per day.

Truck Production by Capacities

(U. S. and Canada)

	SEVEN MONTHS Units			Per Cent of Total	
	1940	1939	Per Cent Change	1940	1939
1½ Tons and less	458,569	430,186	+ 7.4	89.26	92.24
2 to 3 Tons	31,743	20,205	+ 57.0	6.18	4.33
3½ Tons and over	8,911	7,719	+ 15.5	1.73	1.66
Special and Buses	4,202	3,381	+ 24.0	.82	.72
Station Wagons	10,304	4,888	+111.0	2.01	1.05
Total	513,729	466,379	+ 10.0	100.00	100.00

Amortization

(*Continued from page* 269)

this excess of $41,056,336 which will not be subject to amortization unless the Sept. 8, 1939, date is substituted in the final tax law.

The survey of the industry showed that of the total, $34,743,113 was spent in new facilities for expanded production of airplane engines and propellers between the dates mentioned; that $13,089,655 was spent on new airplane production facilities, and that $4,623,487 was expended for new facilities for aircraft accessories and instruments. Colonel Jouett emphasized that contrary to popular belief all of this added investment was by no means provided in contracts on foreign orders. The costs of plant expansion for airplane, instrument and accessories production was financed approximately 100 per cent by the manufacturers themselves, while the new investment for engine and propeller production was financed 65 per cent by the companies, he said.

Knudsen

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above an arbitrary per cent or standard. I do not think a penalty tax should be imposed on normal earnings. If the government needs more revenue, why not obtain it by a flat increase in the corporation tax rate?"

John D. Biggers, chairman of the commission's committee on taxation and finance, declared that the sole purpose of the amortization provision is to encourage private capital to build new plants and facilities. He told the committee that he could see no justifiable reason for the Treasury Department, as proposed in the House bill, keeping its hands on facilities put up by private capital.

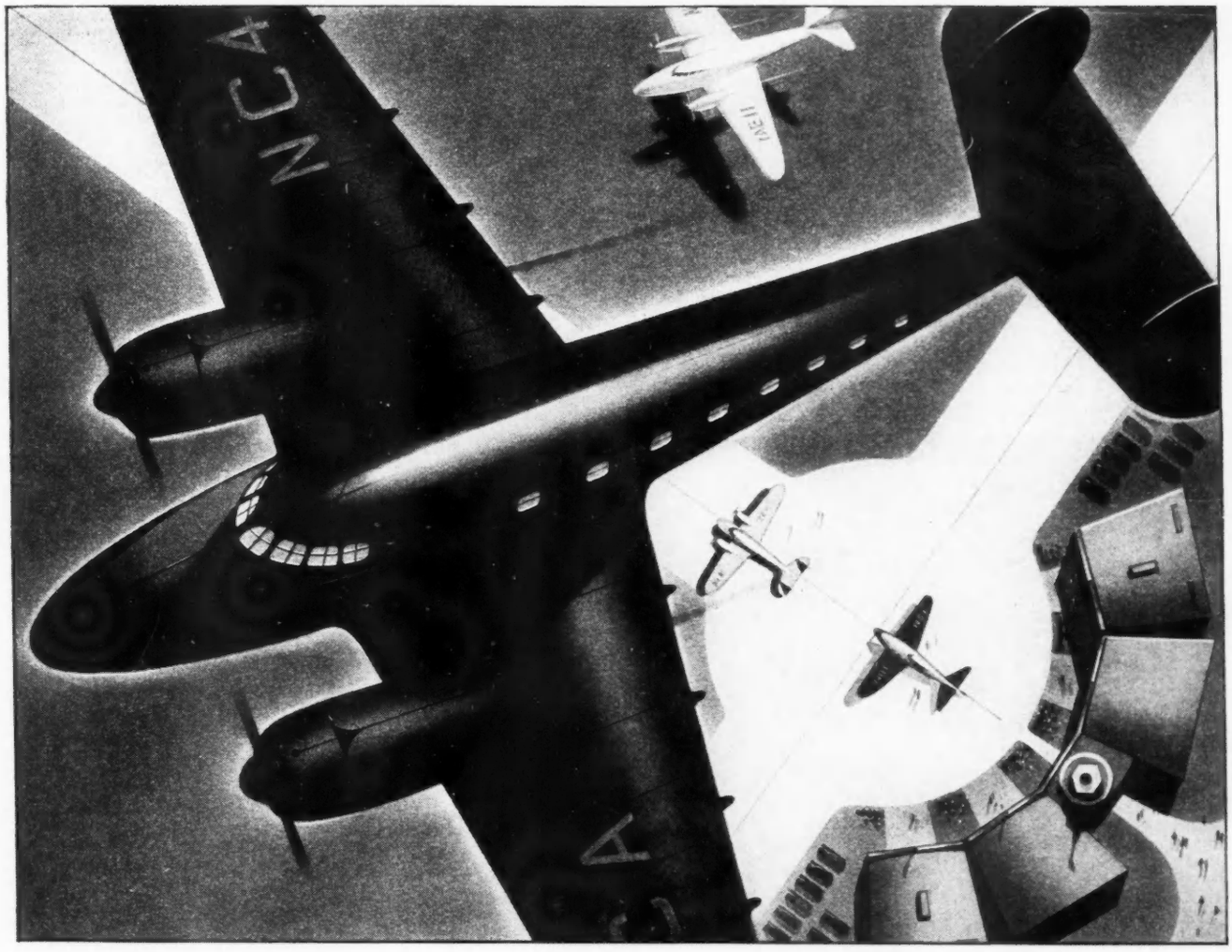
Mr. Biggers reiterated the three plans under which the commission expects to organize the financing of new plants for nation defense:

1. The financing by private capital under the inducements of rapid amortization. (He called this the most important of the three plans.)

2. Initial financing of new plans by private industry but direct reimbursement by the government.

3. Outright construction by the government of facilities to manufacture supplies not produced or used on a large scale in peace time such as powder, tanks, guns and similar products. Details of the commission's financing plan were outlined in AUTOMOTIVE INDUSTRIES of Sept. 1, pages 226-227.

Leon Henderson, head of the commission's price stabilization division, disclosed that the government is already getting price advantages in large-scale orders and that there is "much sharper negotiating on the government's side there was in the World War."



BECAUSE IT'S PAY-LOAD TIME THAT COUNTS

Like all transportation equipment that has to earn its keep, the commercial airplane's economic effectiveness is in direct proportion to the amount of time it is actually carrying pay-loads. Planes grounded for engine repairs or replacements bring in no revenues.

Aircraft engine makers are doing much these days to increase pay-load time by careful selection of the materials which go into their product.

It is for that reason that you will find Molybdenum steels used in so many engines for a wide variety of parts, ranging from cylinders to oil lines. These steels qualify on two essential counts: dependability and reasonable fabrication cost ratio.

Our technical book, "Molybdenum in Steel," contains complete data on steels for engine building. For information on structural steels see "Chromium-Molybdenum Steels in Aircraft Construction." Both these books are sent free on request to executives and production heads.

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MOLY

MEN AND MACHINES

(Continued from page 263)

piston stroke, or with an automatic return after the piston has completed its downward travel. A special hydraulic circuit is available which permits the use of shuttle type fixtures, if desired, to speed up unloading and loading (during the return) stroke, while assuring safety to the operator.

Publications Available on Machine Tools

A 20-page data book has been prepared by Ajax Flexible Coupling Co., Westfield, N. Y. It gives data on horsepower and torque ratings as well as dimensional specifications on the company's complete line of forged steel and cast-iron **couplings**, including conventional and shear pin types.*

Precision Scientific Co., Chicago, has published Bulletin 315 containing detailed specifications and performance data on a wide range of thermostatically controlled, electrically heated constant temperature laboratory devices.*

"Optical Aids in the Metal Working Industries" is the title of Catalog D-22 brought out recently by the Bausch & Lomb Optical Co., Rochester, N. Y.*

The fourth revised edition of its **Grinding Wheel Data Book** has been published by the Abrasive Co., Division of Simonds Saw & Steel Co., Philadelphia, Pa.*

Cone Automatic Machine Co., Inc., Windsor, Vt., has prepared a leaflet entitled "Six Ways to Step Up Production."*

A new chart giving the brands of Jessop **tool steels** recommended for various tools, dies and other applications, has been issued by the Jessop Steel Co., Washington, Pa.*

The infinitely variable speed **buffing and polishing machine,** recently developed by the Standard Electrical Tool Co., Cincinnati, Ohio, is illustrated and described in this company's Bulletin 38-A.*

*Obtainable through editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia. Please give date of issue in which literature was listed.

Buick and Pontiac Announce '41 Prices

Slight increases in prices of their 1941 models were made known by Buick and Pontiac in recent announcements. Buick's list prices have been held to an average increase of 2.12 per cent, while four models have been reduced and another body classification added at a price of $55 lower than its nearest 1940 counterpart. Pontiac's prices have been increased on average of approximately 3 per cent, although it is pointed out that considerable extra equipment has been made standard.

Buick 1941 Car Prices

		1941	1940
Series 40			
41	4-door touring sedan	$ 995	$ 959
46	Business coupe	895	867
46S	2-door sedanet	950	912
Series 50			
51	4-door touring sedan	$1115	$1070
51C	4-door convertible phaeton	1475	1500
56	Business coupe	965	....
56C	Convertible coupe	1195	1170
56S	Sport coupe	1045	1020
Series 60			
61	4-door touring sedan	$1215	$1150
66	Business coupe	1125	1070
66S	2-door sedanet	1170	1115
Series 70			
71	4-door touring sedan	$1275	$1280
71C	4-door convertible phaeton	1675	1680
76C	Convertible coupe	1365	1350
76S	Sport coupe	1195	1200

Series 90—Limited (prices not available).

Pontiac 1941 Car Prices

	Advertised Delivered Price 1941	Advertised Delivered Price 1940
De Luxe Torpedo Six		
Business coupe	$ 828	$ 786
Sedan-coupe	864	822
Convertible sedan-coupe	1023	1007
Two door sedan	874	833
Four door sedan	921	879
De Luxe Torpedo Eight		
Coupe	$ 853	....
Sedan-coupe	889	....
Convertible sedan-coupe	1048	....
Two door sedan	899	....
Four door sedan	946	....
Streamliner Torpedo Six		
Sedan coupe	$ 923	$ 879
4 door sedan	980	935
Streamliner Torpedo Eight		
Sedan coupe	$ 948	$ 916
4 door sedan	1005	973
Custom Torpedo Eight		
Sedan coupe	$1020	$1019
4 door sedan	1077	1076